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VIEWS, NEWS AND INTERVIEWS.

The waterworks and telephone system of Amsterdam, Holland, are now owned and operated by the city. Next year the city proposes to take possession of the gasworks, and later on of the street railway service.

Bob Fitzsimmons, the prize-fighter, had a pet lion named Nero, which recently met an untimely death in Cleveland, Ohio. The weather being warm it was decided to take the lion from the hotel to a natatorium, where a place on the roof, which is inclosed by high walls on three sides, was prepared for him. After the performance at the theater, where the Fitzsimmons party was exhibiting, Ernest Roeber, the wrestler, and Fitzsimmons went to see that Nero was all right before they retired. The swimming master cautioned the men in regard to the electric wires. Nero heard the voice of his master and made a playful spring toward him. The chain attached to the lion's collar came in contact with one of the electric wires. The lion gave a roar, and with a bound cleared the side of the wall and dangled at the end of the chain. Fitzsimmons made an effort to save the lion, and in passing near the wire was struck near the hips by the chain. He shrieked with pain and yelled to his companions to keep away. After recovering from the shock Fitzsimmons attempted to pull the lion back on the roof, but was unable to do so, and, being satisfied that the animal was dead, left the place. An hour later the dead lion was pulled up on the roof. Fitzsimmons valued the animal at $10,000. Fitzsimmons's injuries were not serious, though he was severely shocked. His thighs were burned, and also his left hand.

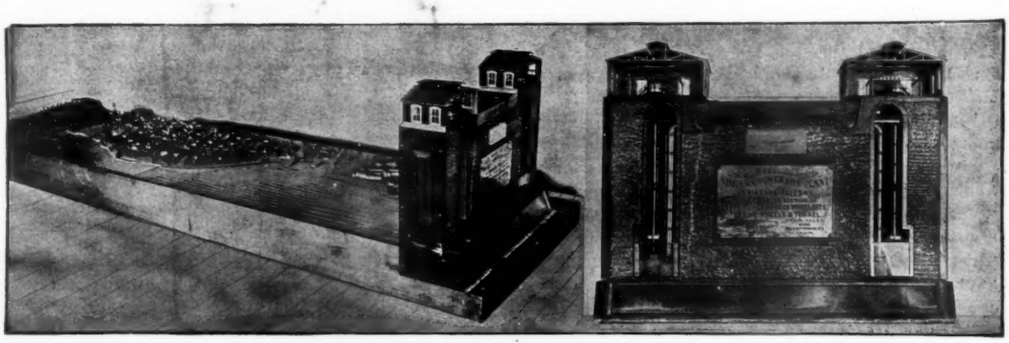
An Arkansas farmer wants to use electric currents to make jelly. He writes to an eastern florist that he wants some "electric plants. Them kind what has such powerful currents. My old woman wants ter use 'em for makin' gely."

Dr. Alfred Cohen, of Berlin, has succeeded in dissolving carbon in a galvanic cell, in precipitating again on a cathode, and in forming a lead peroxide-carbon couple with an electro-motive force of 1.03 volt. This is said to be the first time that carbon has, to all appearances, been obtained in the ionic state.

Telegraphic communication with Buluwayo, South Africa, now surrounded by about 15,000 Matabeles, has been cut off, causing anxiety at Cape Town.

In advertising for candidates for scholarships in a technical college, the Kent County, England, Council recently announced that "in the event of sufficient qualified candidates of either sex not coming forward, qualified candidates of the other sex may be selected in their place."

The Staten Island, N. Y., Electric Railway Company filed a mortgage of $2,000,000 to be used for extending the line.



Model of the Niagara Falls Power Plant, to be Exhibited at the National Electrical Exposition in New York City During May.—(See page 221.)

Magnet and Needle.

To the Editor of Electrical Review:

The report in your columns concerning the removal by magnet of a broken needle from a woman's hand (here in Cherryfield) is true.

The needle in question had pierced the hand eye first, the point having broken off, leaving a piece about three-fourths of an inch long imbedded in the flesh near the thumb.

A light cut was made in the skin over the place where the fragment was located and an electro-magnet applied to the spot. The needle came out at once, cutting its way through the flesh, broken end first.

The magnet used was a piece of two-inch iron, about one foot in length, wound with No. 16 magnet wire, connected with a 110-volt dynamo.

Yours truly,
E. S. Nash,
Superintendent Electric Light Works.

Cherryfield, Me., April 20.

How Would Flush Switches Do?

To the Editor of Electrical Review:

Is there a device whereby an incandescent lamp may be turned on at one point and turned off at another? If you know of any such device, will you kindly inform me who the maker is, and oblige?

Yours very truly,
J. S.

New York, April 18.

ON THE DIFFUSION OF ROENTGEN RAYS.

BY ELIHU THOMSON.

I sent you some time ago a short article on the diffusion of Roentgen rays, and at the time I was not aware that any work of a similar nature had been done, though it is true that certain suggestions had been made as to the turbidity of media by, I thinks Lenard and Professor Roentgen.

I find that Dr. M. I. Pupin has in *Science* of the issue of April 10 given an account of his investigations on the diffusion of Roentgen rays, which accords with my result, in most important particulars. I was not aware that he had done the experimental work which is described in the article, and am now pleased to note that he has gone into the subject very carefully and very thoroughly — in fact, more thoroughly than my time permitted my doing.

These observations on the diffusion of Roentgen rays show that sharp, clear cut shadows of bones or objects imbedded in a considerable depth of flesh can not be expected where the rays have to traverse a considerable depth of flesh after passing the imbedded bone or object, and that blurring or diffusion which wipes out the image may be so great as to make it very indistinct if large masses of semi-transparent material are between the plate or screen and the object the image of which is to be depicted. It is easy, also, for the experimenter to be misled into thinking that the diffused rays back of the bone or object really have come through that object, when in reality the presence of the Roentgen rays back of the solid object, which casts a dense shadow, is due to nothing more than diffusion.

I regret to hear that Dr. Pupin's valuable work in this direction has been interrupted by a serious illness.

ELECTRICITY AND WATER POWER.

BY MARK A. REPLOGLE.

(Continued from page 203.)

THE ELECTRIC MOTOR.

The motor is simply such a combination of electro-magnets as will (through the laws of attraction) cause one circular magnet (called the armature) to rotate on its axis, when the current of electricity is passing through all of them. Although the armature revolves, it is provided with means that allow the passing current to enter it and flow around it longitudinally many times in its circuit, and then flow out and back through the return wire to the source of energy or electrical pressure.

The portion of the motor that keeps this current in the proper wires at all times is called a *commutator*, and is, in some respects, a very complex portion of a motor or dynamo. To define it in simple words, we might say that a commutator is an automatic system of switches that directs the flowing current into such wires of the revolving armature as are necessary to cause the magnetism of the armature to bear such relation to the magnetism of the field magnets that the effect is motion of the armature.

The motor can be built to run with alternating and polyphase currents as well as continuous currents. (A polyphase current is nothing more than a compound alternating current, and requires more than two wires to carry it.) Motors that are especially designed for polyphase currents are called induction motors and do not have commutators. A separate and distinct current is induced and kept within the armature. To this current is due the magnetism necessary to cause the revolutions. A high efficiency is claimed. Motors may be made to run in synchronism, or keep step with alternating current dynamos. Motors may also be built to run intermittent currents.

DYNAMO ELECTRIC MACHINE.

The dynamo is nothing more than a motor running backwards, and the power applied to it forces the electricity around through the wire, to be impeded for light, or have its magnetism impeded for power. (As we have said before, these operations impede the current.) While the magnetism and current always travel at right angles to each other, they, however, are a kind of Siamese twins that can not be separated.

The actual duty of the dynamo is to cause, in a mechanical way, lines of magnetic force from the field magnets to pass around the wires on the revolving armature, and the electrical pressure, endwise in these wires, causes all the electricity in the circuit to move. The greater the pressure the faster the current. Dynamos are constructed for continuous, alternating and polyphase currents, also for high and low pressure.

The dynamo will be treated of more fully under the head "Power Transmission."

BATTERIES.

Batteries are of many kinds, but all of them are simply electric pumps, and the pressure is due to the chemical action. There are two classes, however—open circuit and closed circuit. The open circuit battery is so called because it can not maintain its initial pressure for any great length of time; hence the circuit must remain open when not at work.

The closed circuit battery is usually called a gravity battery, because gravity causes the changes that allow it to maintain a constant pressure. This last battery is employed very largely for telegraphy.

STORAGE BATTERIES.

Storage batteries do not store electricity. A dynamic or other continuous current in passing through them causes a chemical action to take place. When this current is stopped the contents of the cells tend to change to their original condition, and while doing so the battery becomes an electric pump, as any other battery; thus, instead of supplying chemicals, as is necessary with ordinary batteries, they are formed by the dynamic current passing through the cell.

On account of their great weight and disarrangement by the motion of the car, these batteries, or accumulators, have not yet proven a success commercially for driving street cars. The only real storage of electricity is in the principle of the Leyden jar. In this case the electricity is actually taken from one portion of material and deposited in another portion. The quantity thus stored is so limited that it is of no value commercially, and amounts to little more than a plaything.

Accumulators, however, are of real value in central stations. By the direct system of power or lighting a plant must be maintained equal to the greatest required output; but by the use of accumulators a small plant running all the time at good efficiency can accumulate energy enough to permit a heavy output during the busy hours.

ELECTRIC HEAT.

Heat is derived from electric currents in the same manner as light, by impeding the current with resistance. A kind of wire is used that offers a great deal of resistance; this is inclosed in porcelain, asbestos or other insulating material; and the greater the current the greater the heat.

For general heating this is too expensive. The best steam engine can only utilize fifteen per cent (15%) of the energy of the fuel. The dynamo can give a little over ninety per cent (90%) of this; but for cooking, ironing, etc., it is often cheaper than fuel. Cheap water power will be used extensively for heating in the future.

ELECTRICAL UNITS.

The measurement of electrical currents is, perhaps, the most difficult of all measurements to understand, yet without some means of determining the quantity of force and the quality of force, electricity would be of no value in the commercial world.

Electricity was known hundreds of years before it became known in the power world, and it was only after Ohm had demonstrated that it could be measured correctly that it was employed in commerce. The little formula called "Ohm's Law" will perpetuate his name, although to the average reader it may be meaningless. To state it in its simplest form it is: $C = E \div R$; meaning, the current equals the electro-motive force divided by the resistance. We will give below a few of the common units of electrical measurements.

The *volt* is the unit of pressure, or electro-motive force (E. M. F.), and is equal to a little greater pressure than that exerted by a common gravity cell. The volt is represented by "E" in all electrical calculations.

The *ampere* is the unit of current strength and denotes the rate of current flow past a given point in the wire. The ampere is about equal to the rate of flow through a sixteen (16) candle-power lamp burning under fifty-two (52) volts' pressure. In electrical calculations the ampere is represented by "C."

The *ohm* is the unit of resistance or holding back power of the wire. Resistance is the bane of the mechanical engineer, but without it electricity could not be controlled; hence would be of no value. One thousand feet of copper wire No. 10 (Brown & Sharpe) gauge has about one (1) ohm resistance, but if the 1,000 feet were twice as thick, that is, if the area of its cross-section was twice as great, it would only have one-half (½) an ohm resistance, and the less the resistance the greater the flow of current under a given voltage. So the electrician regulates the flow of currents entirely by the resistance, when the dynamo pressure is fixed.

The ohm is represented by "R" in electrical calculations. You will now notice, by the formula, that the number of amperes' flow can be determined by dividing the number of volts, or dynamo pressure, by the number of ohms' resistance in the wire. Also, if any two of these quantities are known, the third can be easily calculated.

The *watt* is the unit of energy and is equal to $\frac{1}{746}$ of a horse-power (746 watts equal one horse-power). If the volts' pressure of a dynamo is multiplied by the amperes' flow, the product will be watts. Divide the number of watts by 746 and the quotient will be mechanical horse-power. The watt is represented by "W."

The *coulomb* is the unit of quantity and is the amount that flows past a given point in a wire, in a second, with a current of strength of one ampere. It is represented by "Q."

The *joule* is the unit of heat, and is found by multiplying volts by columbs. Represented by "Wj."

The *farad* is the unit of capacity and is used in calculations where residual effects are considered. Represented by "K."

The *henry* is the unit of self-induction, and is considered in magnetic calculations. It is represented by "L."

The *dyne* is the absolute unit of force and is the basis of all calculations in electrical and mechanical forces. It is the unit from which all calculations of energy diverge. The dyne is the quantity of force required to start a body, equal in weight to one cubic centimeter of distilled water at a temperature of four degrees centigrade, to a velocity of one centimeter per second. One horse-power (H.-P.) is equal to about 7,464,388,525 dynes in the latitude of London.

Our treatment of electrical principles has been condensed and very general. If the reader wishes details he must consult text-books or engineering works.

FORCE.

Force, motion and power hold certain distinct relations to each other, but, on account of inaccurate thinking, they often form a kind of mixture in our mental conceptions. Force might be regarded as pressure, or ability to put material in motion. We have no sense that can detect force except by its action on material. Its effect only can appeal to our senses; hence our reasoning powers. In a few avenues man has learned to control it. He can store it and release it only by bringing other forces to bear upon it.

Nature has supplied forces in infinite quantities and numbers. These forces are in continual warfare with each other. A lazy man pauses until he gets a faint conception of some of them, employs a few of these to accomplish his selfish ends, and stands before his less observing brethren a philosopher.

As before said, force is the ability or pressure that can give motion to material. Motion is the result of force applied to material, but sustained motion the result of force continually applied to material; that is, the time of the motion must be considered in reckoning power.

The ordinary unit of power is the foot-pound. It is the amount of power represented by one pound of material, acted upon by the force gravity, in moving one foot toward the center of the earth in one minute of time. The ordinary definition of foot-pound is the amount of power required to lift one pound one foot high in one minute; 33,000 foot-pounds are called one horse-power (H.-P.).

(To be continued.)

Electric Furnaces For Gold Ores.

To the Editor of Electrical Review:

Will you please let me know if there are any electrical furnaces that will melt and work low-grade gold ores so as to make them pay? Can you tell me of any electrical furnaces now working on such gold ore or tests that have been made and what success they have had? Which is the best electrical furnace for low-grade ores? W. A. B.

Atlanta, Ga., April 16.

The Superior Court at New Haven has ordered a final dividend of one and one-fifth per cent on the claims against the Ansonia Electric Company, which failed some time ago, with liabilities of about $260,000.

RECENT DEVELOPMENTS IN VACUUM TUBE LIGHTING.

READ BEFORE THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, NEW YORK, APRIL 22, 1896, BY D. McFARLANE MOORE.

Most people have been accustomed to oil lamps, gas jets and other forms of light which have about reached their perfection. With the appearance of the arc and incandescent lamps it was thought that electricity had reached its limit in giving to the world a system of illumination that would leave nothing more to be desired. Indeed, it seems almost a presumption to dare to think of light being produced that would approach daylight in form and quality. The time is not so very remote when any man, who would have attempted to manufacture sunshine, would have shared the fate of a Galileo.

But fortunately the investigator of to-day has nothing of this kind to fear. Much arduous labor has already been expended in the solution of the problem by many eminent electrical scientists engaged in the study of vacuum tube phenomena, but the results, from a practical point of view, have been very meager. This is chiefly owing to the complicated and expensive apparatus necessary, and the very unsatisfactory results even then obtainable. In fact, light from vacuum tubes, which is the only form of illumination that actually approaches nature's standard—daylight—has never been obtained in any quantity that would, in any way, be suitable for practical use. Of the other forms of electric lighting, the incandescent lamp is the most prominent. It is the peer of all illuminants in commercial use to-day, but is lacking, when we consider maximum uniformity in the distribution of light, and when calculations show that only three-tenths of one per cent of the energy of the coal necessary to produce light by incandescence (its name defines its character) is actually transformed into light, it is evident that there is room for improvement. The new electric light should possess all the good qualities of the present lamp with none of its drawbacks, and among its improvements will be noted the combination of utility and decoration. The recognized tendency of the day is towards multiplication of lights and avoidance of strong shadows—in other words, an even illumination; that is, light from all directions.

The object of this paper is not only to call attention to the advantages that will accrue with the adoption of vacuum tube lighting, but more particularly to a simple method of obtaining a current which will ultimately make such an adoption universally feasible. Almost without exception, experimenters in vacuum tube lighting have hitherto sought for the solution of the problem by merely pushing to extreme well established methods based on principles long known in the art. That is, strictly speaking, no radical departures from the well beaten paths have been as yet brought forward. However, this paper does represent radical departures—in principles, in apparatus and in the nature of the current, resulting in a light of greatly increased intensity.

Before entering upon a description of the new system, permit me to call your attention to the methods heretofore used for obtaining light from hermetically sealed glass tubes containing a rarefied gas.

For many years the Geissler tube has been a scientific toy. When a suitable electric current is connected to its terminals, its entire length is filled with a faint glow. This is, of course, a light of radically different character from that now used in any commercial form of illumination. (See Fig. 1.)

It is light emanating from rarefied air with an apparent absence of heat and combustion. Upon this principle developed probably depends the light of the future, which will soon be, in the opinon of the writer, the "light of the present." As a device for transforming electrical energy into light, the vacuum tube is very efficient. The majority of authorities place it at about 70 per cent and the incandescent lamp at two per cent. Notwithstanding this remarkable efficiency, it has never been commercially possible to illuminate by vacuum tubes, because the light could not be made sufficiently intense (this is expressing it mildly) even with bulky apparatus that was entirely impracticable.

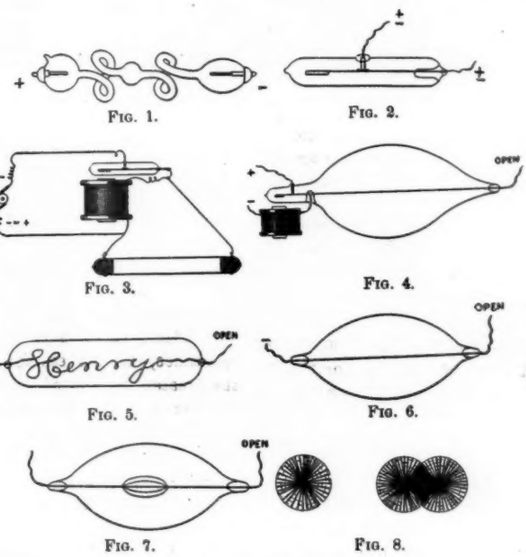


FIG. 1. FIG. 2. FIG. 3. FIG. 4. FIG. 5. FIG. 6. FIG. 7. FIG. 8.

DIAGRAMS ILLUSTRATING MR. D. McFARLANE MOORE'S PAPER ON "RECENT DEVELOPMENTS IN VACUUM TUBE LIGHTING."

Furthermore, the current produced by such apparatus was of such a nature as to render its insulation extremely difficult. The ordinary induction coil is often used for this purpose. A current of low voltage, such as that from a battery of a few cells, must be used with such a coil, because a current of higher voltage could not be properly disrupted, the arc forming, preventing a sudden break of the current. But since the light depends on the suddenness of the break, the arc must be prevented; therefore, the quicker the break the brighter the light — provided the apparatus is properly designed.

The quickest break can be made by interposing in a circuit the most perfect dielectric in the minimum space of time. The best dielectric known is a vacuum, and I have discovered methods for interposing it in rapid succession in a current in a minimum space of time, depending upon the principle of making and breaking a current rapidly in a vacuum.

The disruption of any current in the air results in the formation of a spark of greater or less length; and the greater its length, the less sudden the break. Therefore, if the break be made in a vacuum, the narrowest conceivable complete gap in the metallic conductor results in an almost instantaneous discontinuance of current, insuring a maximum C. electromotive force. The current is thus interrupted in an almost infinitely short space of time, as compared with all the ingenious mechanical contrivances, such as air-blasts and magnetic blow-outs, devised for the purpose of breaking a current suddenly in the open air, but all of which are of little avail for the production of any quantity of light.

The vacuum vibrator, as shown in Fig. 2, is the nucleus of my invention. Although an exceedingly small device (not as large as one's finger), it demonstrates when in circuit with a small magnet (not as large as a teacup) a principle embodying great possibilities. It is a new piece of apparatus, exemplifying a principle of value, not only applicable in practical use, but also an improved implement for scientific investigation.

It is almost unnecessary to describe such a simple piece of apparatus, which consists merely of a spring rigidly supported at one end, and having attached to its free end a small disk of soft iron. A contact point rests against the spring at about its center. A sealed glass tube, from which the air is exhausted, incloses both spring and contact point. The system, as a whole, is exceedingly simple. An electric current passes through a coil of wire and then through the vacuum vibrator. Wires in contact with the outside of each of the ends of a closed and empty glass tube are attached to the two ends of the coil of wire. This statement embodies the gist of the invention (Fig. 3). It will be noticed that this system is far simpler than the apparatus ordinarily used to excite Geissler tubes. The secondary coil is absent, reducing the expense and bulk many fold, as are also the metallic terminals sealed into the ends of the Geissler tube; but it produces light, the desideratum, in wonderfully increased volume.

With this apparatus, currents of almost any voltage can be rapidly and suddenly interrupted, and it is therefore now possible to obtain, by using ordinary commercial currents, strong light in vacuum tubes.

When the circuit through the magnet and vibrator is closed, the armature within the vacuum vibrates rapidly, disrupting the current within the vacuum at each vibration.

The resulting high-tension current excites a brilliant luminosity in another tube, usually of much larger dimensions, and containing a lower vacuum than the vibrator tube. There is, therefore, a necessity for two vacuums—one the very highest, the other very low. However, I have tried a number of experiments, using but one vacuum, practically amounting to an enlargement of the vibrator tube and a lowering of its vacuum. (See Fig. 4.)

This is manifestly not a good plan for the production of light, because the breaking of the current does not occur in a high vacuum, but it led to an interesting line of experiments, the most novel of which will now be brought to your attention.

Within this low vacuum is placed a wire which can be bent and shaped into any form desired, as shown in Fig. 5. When connected to the vibrator, the beautiful effect is immediately apparent, the wire being enveloped in a delicate purple glow. This can be applied to various purposes, such as advertising. One wire only connects this sign tube to the vibrator, and it is attached to the armature terminal of the vibrator, because, when so connected, it is the one which receives the high-potential discharge of the magnet. In the bulb now shown (Fig. 6), the vacuum is higher, and a single wire extends through the center. The light, instead of appearing as a purple envelope around the wire, now fills the entire chamber with a beautiful milky glow.

Close inspection, however, reveals the fact that there is a very small, dark space immediately encircling the wire, and beyond it there appear to be rapidly moving rings of light, concentric with it. In fact, one is reminded of the field of force surrounding a conductor, as displayed by the familiar arrangement of iron filings; indeed, it is a similar phenomenon—the molecules of the residual gas taking the place of the iron filings.

The next bulb (Fig. 7) is similar to the one last shown, but with one exception. The wire is not single throughout its entire length; for a space of about three inches at its center it separates into six strands, which thereby form a kind of cylindrical cage about one-half an inch in diameter. In this case the entire bulb is not filled with a glow, but the interior of the cylinder forms a pencil of light quite dense, denoting that a new principle is brought into play. It is this—every current creates its own electro-static field around its conductor, which, when immersed in a gas at the proper degree of rarefaction, causes it to give forth light, which is most dense in a comparatively small circle surrounding the conductor. (See Fig. 8.)

(To be continued.)

To Members of American Institute of Electrical Engineers.

A member of the Institute mourns the loss of a silver matchbox, valuable principally because of its associations, which he inadvertently left on a table at the last meeting, Wednesday, April 22. One side of the matchbox is enameled in white, on which are depicted a burning cigar and an appropriate motto. On the other side are engraved a crest, motto and monogram, and on the lid a date. The finder, or any one having knowledge of the finding, is requested to communicate with the secretary of the Institute.

Boiler Contracts.

The Abendroth & Root Manufacturing Company, 28 Cliff street, New York city, have closed contracts for their Root improved water-tube boiler for the electric light and power plant of the East River Bridge, Munsey's new building and the Electrical Exposition, New York city.

THE ELECTRIC LOCOMOTIVES IN THE BALTIMORE TUNNEL.

ABSTRACT OF A PAPER READ BEFORE THE NEW ENGLAND RAILROAD CLUB BY DR. LOUIS DUNCAN.

The smallness of the leakage in this overhead construction has exceeded all expectations, especially as the tunnel is exceedingly damp, moisture constantly condensing upon the structure, and there being a constant drip upon certain portions of the work, through the brick arch of the tunnel. The working voltage on the line is about 650 volts.

The following is the service given by the motor for the month of December, 1895:

Total number of days.....	31
Total number of trains.....	365
Total number of cars.....	8,755
Average time per train, minutes.....	10
Average number of cars per train.....	24
Average number of trains per day.....	12
Average amperes per train..	985.1
Average amperes per car....	41
Average voltage.....	675
Average horse-power per train.....	891
Kilowatt hours.....	40,446.1

Perhaps you would like to know something of how we found the measure of what the locomotives could pull. We knew they would pull considerably, for we found by turning on the "juice" too suddenly we would generally jerk out a drawhead or break some coupling pins or links. For a short while after we had started the regular service we had considerable trouble in this respect. We electrical people attributed it, of course, to the poor quality of the drawbars, etc.; but after awhile we learned how to apply the power, and how to start a long freight train. We find there is quite a knack in starting a train, as a great many of you gentlemen can testify, no doubt. But I can say we have now mastered it, and the locomotive operators have now no trouble whatever in bringing a train up to speed from a standstill. In fact, these operators, who were old steam engine men, say they can accelerate a train without jerks better with the electric locomotive.

The starts are made on a down grade of six-tenths of one per cent, leading to the south portal of the tunnel. After the tunnel is reached the train commences to ascend an up grade of eight-tenths of one per cent, which continues through the tunnel. We obtained the Pennsylvania Railroad dynamometer car to measure our pulling capacity. The most the car would record was 26,000 pounds drawbar pull. As the electric locomotive we knew would pull considerably more than this, we were obliged to select a light train. The results obtained in the first trip were, first, the total drawbar pull for a certain weight of train from which we calculated directly the drawbar pull per ton of train on the eight-tenths of one per cent grade. This we found to be 22 + pounds. After subtracting the grade pull, which, for an eight-tenths of one per cent grade, is 16 pounds per ton, we have the difference 6 + pounds as the train resistance per ton. This, you will note, confirms the D. K. Clark and other authorities' figures for freight train resistance. The drawbar pull per ampere we found was 28.6 pounds.

The operators of the locomotives are old B. & O. engine men, and they have become quite expert in the handling of these machines. It was thought at first that it might be necessary to have an electrician on the locomotive continually, but it is very gratifying to state that the operators are their own electricians, and they are able to handle the locomotive in every way as regards its operation. They are becoming more familiar daily with its simple mechanism, and are fully able to keep the machine in first-class condition themselves.

The current indicator or ammeter referred to is a very good thing for them in the operation, as by it they can see exactly the character of the train and of the track, and are able to instantly note the increase of pull as they open the throttle; and, consequently, they are not so liable to slip their wheels as on a steam locomotive.

We decided to measure the acceleration; that is, how fast could we bring a train of 900 or 1, 00 tons up to a speed of 12 or 15 miles an hour. We decided that if we could record the distance traveled in each interval of two seconds, commencing from the start, and then lay these distances out as ordinates, we would get a curve showing the acceleration of the train. From the observations made we found that we could accelerate a 985-ton train up to a speed of 16 feet a second, or about 12 miles an hour, in a period of one minute. I doubt if a steam locomotive of equal weight could equal this performance.

We have exerted over 60,000 pounds drawbar pull even on the track in the tunnel, which at times is very damp and greasy. We have made a speed, running light, of 61 miles an hour on an up grade. On a level this would mean 70 or 80. With a 300 or 400-ton passenger train we are able to make 40 to 45 miles. As our locomotive weighs 194,000 pounds, you see we are getting a drawbar pull of about one-third of our total weight, which is the adhesive weight.

An underground wire bill has been passed by the House of Delegates, St. Louis. All wires, except the trolley lines, are to be underground by June 30, 1897.

The New York Press Club Honors the Memory of Col. John A. Cockerill.

At a specially called meeting of the New York Press Club, held on April 14, presided over by President Joseph Howard, Jr., the following resolutions were adopted:

The New York Press Club, at a special meeting held on April 14, 1896, in the club house, desires to express its profound sorrow and regret at the untimely death of its late president, John A. Cockerill.

In a long and successful career in the newspaper world he distinguished himself as a brilliant reporter, an able and diplomatic correspondent, a skillful editor and sagacious manager, and, above all, as one who took advantage of every invention and discovery to increase the scope and excellence of the daily press.

As member and president of the New York Press Club for five years, he evinced an interest and affection for its welfare that will never be forgotten. He increased its activities, developed its philanthropies and raised it to a condition of which every member will always be proud.

In private life he was a true friend, a warm-hearted companion, a generous employer, a public-spirited citizen, an enthusiastic patriot and a brave soldier.

President Howard, Foster Coates, James B. Townsend, John C. Hennessy, Murat Halstead, Hon. Robert Roosevelt, Dr. John Friederich and many others spoke of the many kindly qualities and great abilities of Colonel Cockerill. A committee consisting of J. I. C. Clarke, Chas. W. Price and John W. Keller were appointed to represent the Press Club in the funeral ceremonies and confer with Mrs. Cockerill. The president was authorized to appoint a special committee of the club to accompany the body to St. Louis, where it will be interred by the Elks of that city.

American Institute of Electrical Engineers.

At the 105th meeting of the Institute, held at 12 West Thirty-first street, New York city, April 22, about 200 members and guests were present. A paper was read by Mr. D. McFarlan Moore, of Newark, N. J., on "Recent Developments in Vacuum Tube Lighting." It was accompanied by numerous experiments, and the hall was lighted with tubes, which were suspended horizontally from the gallery in a double row. Owing to the lateness of the hour of adjournment, there was no discussion.

At the meeting of council in the afternoon 12 associate members were elected, and four associate members were transferred to membership.

It was decided to accept the invitation of the National Electrical Exposition Company and hold the annual general meeting in the Exposition building, beginning on May 19.

Lewis Sperry, as receiver of the Schuyler Electric Manufacturing Company, of Middletown, Ct., has been ordered to distribute the funds on hand, about $75,000, to the preferred stockholders.

A Bicycle Factory Operated Exclusively by Electricity.

One of the most interesting modern stations in this country, and the first, perhaps, which has a larger motor load than a lighting load, is that at Middletown, Ohio, operated by the Middletown Electric Light and Power Company.

It is now some four months since Mr. F. H. McKnight, president and general manager, determined on an increase in his station, which, up to that time, had operated on a small scale only. The conditions with which he was confronted showed the necessity for a system of distribution which would allow him to cope with a large demand for current for motor service during the day and a similarly large one for lighting after dark. Mr. McKnight selected the monocyclic system of the General Electric Company.

The power house is large and well ventilated and is situated near the center of the city in an ideal location for an electric station. It fronts on the Cleveland & Cincinnati Canal, while immediately behind it are the tracks of the M. & C. Railroad. Water for the station is taken from the canal in front and the necessary coal is shoveled directly into the bins from the cars standing on the tracks behind.

FIG. 1.—GENERATING STATION, MIDDLETOWN, OHIO.

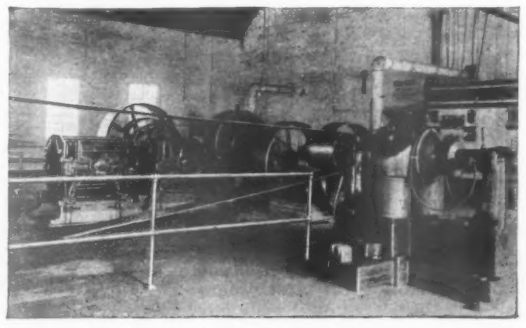


FIG. 2.—INTERIOR GENERATING STATION, MIDDLETOWN, OHIO.

The steam equipment consists of two Brownell & Dayton boilers furnishing steam to one 250-horse-power Russell engine and one 100-horse-power Ball engine. The first runs at 164 revolutions and drives from a countershaft the new monocyclic generator and two Thomson-Houston 75-light arc dynamos; the latter runs at 285 revolutions and drives a D 62 Thomson-Houston bipolar, direct-current, low-voltage machine. The monocyclic generator is a standard 12-pole machine, running at 600 revolutions. It is rated at 150 kilowatts at 1,040 volts, and is excited by a one and one-half kilowatt exciter. The D 62 furnishes current for direct-current motors scattered throughout the city. The arc machines operate lights in the streets, while the monocyclic is wired for about 180 horse-power in motors and 2,000 lights. If all the lights and motors were operated at the same time, the total amount of energy required from this generator would be about double its capacity, and its power to cope with the conditions illustrates forcibly the advantages of the monocyclic system. During the day the lights burning are comparatively few, while the

motor load is at its maximum. This condition is reversed after dark, when the motor load drops off and the lighting load rises in turn. The generator, which runs 23 hours per day, is worked continuously at its highest efficiency, and satisfactorily fulfills its double duty without sparking or noticeable heating.

With service of this severity, deterioration in the performance of the machine would naturally be expected, yet it has been running for about three months under these onerous conditions without a minute of lost time from any cause whatsoever.

The regulation of the machine is noteworthy, the voltage remaining almost absolutely constant. The lights at a large factory, about a mile away, and those throughout the city burn with equal brilliancy, and the throwing on or off of the motor load is accomplished without flickering or variation of the intensity of the light. In fact, the presence of the motor load is usually only determined by examination of the ammeter. This perfection of regulation is attained by placing the stationary shunt of the alternator in a certain position in the morning and leaving it thus during the day, while the induction motor load dominates. At night, when the lighting load is the heavier, the only change necessary is the advancing of the stationary shunt about one inch. No care beyond this is needed to maintain a constant potential. The machine apparently takes care of itself.

The most important client of the Middletown station is the Miami Cycle and Manufacturing Company, whose factory is located about one mile distant. It takes current for 180 horse-power in motors, for 800 incandescent lamps, of which 400 are usually in use, and for six arc lamps. The cycle company turns out about 200 wheels a day, and employs from 500 to 600 hands. It manufactures an extremely high-grade bicycle, and acknowledges the assistance to this end which electric service renders.

The current is transmitted from the station to the works over two mains and a teaser wire at about 1,000 volts, and is reduced to about 115 volts in six 30,000-watt oil-cooled transformers installed in a small house erected in the angle of the L-shaped main building. All the motors derive their supply of current from these transformers connected in multiple. The lightning circuits are taken off from two 7,500 and one 15,000-watt transformers. The primary wires from the station are passed through a station wattmeter just before they arrive at the transformers, and thus the consumption of energy in both lightning and motor circuits is measured in one instrument.

The secondaries run from the small sub-station north and south to the motors and lights in the two legs of the L. Those running south operate in the machine shop three 20-horse-power motors, each belted to a long line of shafting from which run 80 belts. One of these motors is used to drive 15 lathes, four shapers and six milling machines, three water emery wheels, one planer, one die sinker, two universal grinders, two gear cutters and two drill binders.

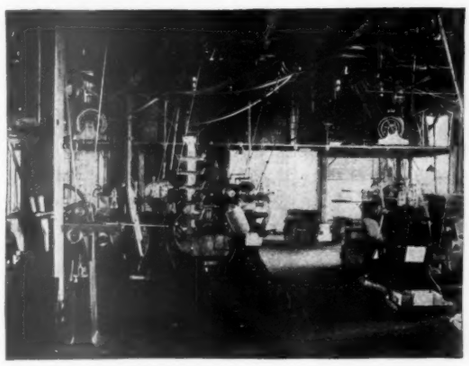


FIG. 4.—CORNER OF MACHINE ROOM SHOWING INDUCTION MOTORS.

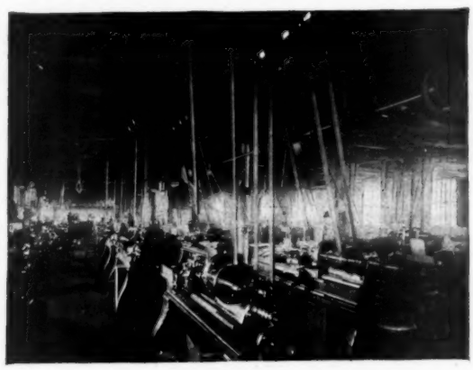


FIG. 5.—MACHINE ROOM SHOWING MACHINERY DRIVEN BY MOTORS.

FIG. 3.—MIAMI CYCLE AND MANUFACTURING COMPANY'S PLANT.

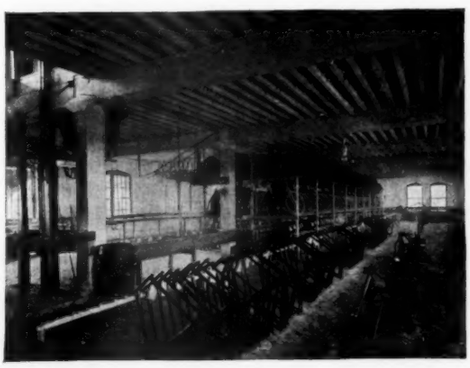


FIG. 6.—PART OF ASSEMBLING ROOM SHOWING MOTOR FOR ELEVATOR.

The other two operate 35 screw machines, one oil separator, one oil pump and two high-pressure blowers, giving air to the forges in the smithy.

The feeders running north supply energy to three 30-horse-power motors, two of 10 horse-power and two of five horse-power. One of the 10-horse-power motors is in the drill room and runs a shaft from which belts run to 12 large and three small drill presses, two cone grinders and four small milling machines. In addition it operates one band saw, one circular saw and one wood-turner's lathe in the pattern room adjoining. The other 10-horse-power motor is in the frame-making department and drives three large punch presses for the manufacture of handle bars, seat posts, etc., three large drill presses, four small ones, two frame assembling tables, three small milling machines, two emery grinders, one swaging machine, four stock machines, two tooth cutters and one double polishing lathe.

A large portion of the power which comes into the factory is used in the polishing room, where 35 double polishing lathes run incessantly. These are operated at present by two 30-horse-power motors. The remaining 30-horse-power motor in the north section drives a 48-inch exhaust blower, which carries away the dust from the polishing room.

Located in the assemblying department is a five-horse-power motor, which operates a freight elevator of 1,500 pounds at 60 feet per minute capacity through the room. When this was put up it was thought that a large motor would be required to move up and down the occasional heavy loads, but the five-horse-power motor not only operates the elevator satisfactorily, but also has sufficient power left to drive five small drill presses. The other five-horse-power motor drives a five-kilowatt C. & C. generator, used for plating purposes.

All these motors are of the General Electric induction type, without commutator, collector or moving contacts. They are set up on platforms swung from rafters in the rooms, an arrangement rendered possible by the fact that they require no attention beyond an occasional oiling, and thus occupy no floor space whatsoever.

The introduction of the induction motors into these works was the result of pure conversion. Skeptical at first, the company, willing enough to allow a trial, permitted the installation of a 20-horse-power motor as an experiment. It reached the factory in September, 1895, was put into service in the machine room and ran the machine for the night shift. The experiment was as severe a test as could well be imagined for a motor. It ran over 300 feet of three-inch shafting, 172 belts, five screw machines and 17 other machines, such as drills, lathes, etc. The usual course was to add machine after machine until the motor stopped. One or two would then be thrown off and under an excessive overload which brought it within the reach of breaking down. The motor continued to run for its shift of 10 or 12 hours. No accident happened to it during the two months this course of treatment continued.

Its missionary work was successful. It was purchased by the cycle company, which ordered eight others at once, to be sent by express. Their factory could not be equipped electrically too soon for them. The constant speed of the machinery has enabled them to turn out a wheel with workmanship of peculiarly high quality, and its success has compelled them to enlarge the works, which are entirely lighted with lamps taking current from the monocyclic generator.

In addition to the load at the Miami Cycle Works, the monocyclic generator supplies current to 500 or 600 lights throughout the town, and 650 incandescents in the Sorg Opera House. With 50 horse-power in motors and 400 lamps burning at the cycle works, and as many in the city, the lights in the Opera House burned brightly and without flickering.

The description of this noteworthy plant, the success of which is due to the able management of Mr. McKnight, may fitly be concluded with his own remark, "In all particulars it surpassed my most sanguine expectations."

FIG. 7.—ASSEMBLING ROOM.

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SPECIAL NOTICE TO ADVERTISERS.

***CHANGES** for advertisements must be in this office by Friday noon for the following week's issue.*

***NEW ADVERTISEMENTS** should be in the office not later than Saturday noon to insure publication the following week.*

NEW YORK, APRIL 29, 1896.

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"ELECTRICAL REVIEW" OFFICES REMOVED.

After May 1 the publication and editorial offices of the ELECTRICAL REVIEW will be located on the ninth floor of the Times Building, 39 and 41 Park Row, New York city. We leave our old offices, at 13 Park Row, after having occupied them for nearly 10 years, because that building is to be demolished to make way for one of the finest modern office buildings in the world. Our new offices in the Times Building are well adapted to our purposes, and our many friends will find the same hearty welcome awaiting them as they received at our old lucky number "13."

Visitors to the convention of the National Electric Light Association and to the Exposition are cordially invited to call.

While the tone of business throughout the country is generally depressed, the electrical industry is enjoying a good trade with bright prospects ahead. There are several contracts to be placed in the near future involving the expenditure of several million dollars.

Mr. Mark A. Replogle's articles on "Electricity and Water Power," now appearing in the ELECTRICAL REVIEW, seem to have struck a popular chord. The interest taken in them shows that there are many people beside electricians and turbine manufacturers who are interested in water-power development.

Not the least interesting part of the National Electrical Exposition to be held in New York city during May will be the loan and historical exhibit of electrical apparatus and relics. A careful and intelligent inspection of this exhibit will be a liberal education in itself. The collection will include valuable mementoes of the progress of the art in every branch, and there will be an abundance of material to interest the general public.

May promises to be a record-breaking month in point of electrical interest. We will have the National Electrical Exposition in full blast during the whole month. Besides that there will be held in the same building with the Exposition the annual convention of the National Electric Light Association and the annual general meeting of the American Institute of Electrical Engineers. There promises to be a constantly changing crowd of electrical people attending these various functions during May, and it is safe to predict that this month will go down in history as an electrical month, composed entirely of red-letter days.

The progressiveness and the enterprise of the American spirit are strikingly shown in the interest taken by the press of the United States in Roentgen's X-ray discovery. The technical journals—electrical and otherwise—have published hundreds of pages, with costly illustrations, noting the developments and results achieved by scientific men all over the world. The daily press has also printed many columns, characteristically tinged with sensationalism, on the X ray. The British electrical journals have devoted but a limited amount of space to the matter, and have drawn largely on their American contemporaries for their information. In years to come, when we have learned a little of what these radiations really are, and can understandingly appreciate the wonderful results of which they now give promise, it will be to the files of American technical journals that scientific men and others will turn for historical facts on the subject.

THE FINANCIAL SIDE.

All of the security markets advanced this week in response to growing confidence that seems to be international in its scope. The statement of Great Britain for the fiscal year just closed, showing a remarkably sound financial condition, put consols up to 114, or to a figure yielding slightly more than 2 per cent. This was a signal for European buying of our securities, that was checked about mid-week by the very ingenious, but apparently unfounded, cable of the London *Times*, parading the Venezuelan war ghost. The home demand continued, however, closing all the markets strong. The business situation is much better than at any time since March 1. Crop prospects are improving steadily, and the exchange situation does not create any uneasiness. Add to these factors the very low range of values of both securities and products, and a basis for sharp appreciations is generally recognized.

The feature of the week in electrical circles was the General Electric report for the year ending January 31. Its most striking feature is the continuation of the policy inaugurated several years ago, of charging off a certain amount of earnings to depreciation and applying the balance of earnings, as well as revenues derived from the sale of securities, to a reduction of the profit and loss deficit, which is now $13,917,071 against $14,794,716 a year ago. A close study of the report affords much encouragement to the security-holder, not on account of the increased volume of business done or the profits derived as compared with previous years, but because of the continuation of the policy of doing business on a cash basis. Also the concentration, both of which measures are shown to be bearing fruits and indicate that they will tell in the end. The earnings for the year, not counting the $511,321 written off, are equivalent to 7 per cent upon the preferred and 3.57 per cent upon the common stock.

I am convinced that, in view of the working arrangement of Westinghouse, other consolidation measures, the methods of doing business and an increased demand for electrical goods, the company will soon make decided progress in regaining its old position.

The Western Union press agent is again hinting at the possibilities of his company engaging in the telephone business on and after next November, when the contract with the Bell company expires. This would all be very nice and plausible, provided the telegraph company could secure the instruments necessary for telephone operation. On the other hand, it is no trick to attach a key and sounding-board to a telephone wire. Western Union knows this, and is doing a great deal of sweating in consequence.

The rapid transit crocus is unfolding this Spring just as I said it would. There is the Brooklyn Bridge scheme proposition to release the Manhattan,

propositions from that company to extend its service in consideration of certain valuable franchises, etc., etc. Nowhere is reference made to the underground transit which citizens voted for a couple of years ago. Keep your eyes on Gould and Sage. They hold the key to the situation, and are playing a waiting but sure game.

In electrical stocks there was very little interest beyond the three-point advance in Western Union on what appeared to be Gould manipulation. The price of General Electric had evidently discounted the report, as it closed the week practically unchanged. Edison Electric Illuminating of New York advanced 1¼ to 99¼, and subsequently sold at 98½. The bonds sold at 103½ to 104. American Telegraph and Cable was traded in on a limited scale between 94½ to 95.

On the Boston Exchange, Bell Telephone advanced 2 points during the week, closing with a net gain of 1¾. In Philadelphia, Electric Storage Battery common ranged between 33¼ and 34¼, while the preferred sold at 35 to 35¾. Erie Telephone was steady at 60 to 60½. General Electric preferred sold during the week at 77½ @ 77¾, closing at 76 bid, 78 asked. There was no trading in New England till the latter days of the week, when a small lot sold at 90, the stock closing at 94 bid, offered at 95. Fort Wayne Electric was bid 1, offered at 2; Westinghouse common, 29½ bid, 30 asked, and the preferred 53 to 53½. BAIN.

New York, April 25.

National Electric Light Association.

The various passenger associations have granted the rate of a fare and a third, on the certificate plan, to delegates attending the convention of the National Electric Light Association, to be held in New York, May 5, 6 and 7. It is positively necessary that delegates, when purchasing tickets, should state to the agent that they are delegates to the convention of the National Electric Light Association and should obtain from him a certificate that they have paid full fare, which certificate, when properly signed in New York, will entitle them to return passage at one-third the regular fare. It is absolutely necessary that this certificate be obtained when tickets are purchased; otherwise, it will be impossible to take advantage of the reduced rate returning. These certificates are good going three days prior to the opening of the convention and are good to return only three days after the adjournment. The electrical special will leave Chicago Saturday, May 2, at 5.30 P. M., via Lake Shore & Michigan Southern road, arriving in New York at 6.50 P. M., Sunday, May 3. Accommodations on this train may be secured by addressing either W. A. Kreidler, 510 Marquette Building, or C. K. Wilber, western passenger agent Lake Shore & Michigan Southern Railroad, Chicago, Ill. The indications are that this train will be a very heavy one, and Mr. Kreidler has arranged all the details so that it will be as fine a convention train as ever run, if not the finest.

GENERAL ELECTRIC COMPANY'S FOURTH ANNUAL REPORT.

THE ANNUAL MEETING TO BE HELD AT SCHENECTADY, N. Y., ON MAY 12.

The annual meeting of the General Electric Company, to elect a board of 13 directors and transact other business, will be held at the company's offices in Schenectady, N. Y., at noon on Tuesday, May 12. The fourth annual report of the company has been issued. It covers the operations of the company for the year ending January 31, 1896. President C. A. Coffin's report is as follows:

SCHENECTADY, N. Y., April 18, 1896.

To the Stockholders of the General Electric Company:

In their last report, your directors referred at some length to the liquidation of old assets, and stated that the sum of $2,000,000 had been charged to profit and loss, for the purpose of providing for all shrinkages which could then be anticipated in the liquidation of old matters.

Much has been accomplished in the year just closed in liquidating old and slow assets, and the condition of the assets of like character which still remain on the books of the company is such as to enable your officers to more definitely fix their proper values. Information regarding these matters will be found in the report of the second vice-president, to which particular attention is invited. There have been charged against the $2,000,000 item above referred to the sum of $530,152.16, representing the shrinkages which have accrued from the liquidation so far as completed, leaving $1,469,847.84 still standing to provide for possible shrinkages in the future. It is the belief of your directors that this amount is sufficient to cover all the purposes for which the above sum of $2,000,000 was originally set apart.

The business secured by your company for the fiscal year just closed was less than 10 per cent greater in value of sales than for the year previous. The actual increase in output of factories, based upon capacity of machines and number of articles produced, is more than 30 per cent greater than for the previous year. While the selling prices, as thus shown, have been materially reduced, there has been a corresponding curtailment in manufacturing and other expenses and lowering in costs, largely due to improved designs and methods of manufacture.

As will be seen by the statement of profit and loss, the business of the year just closed, including royalties, amounted to		$13,315,667.12
Cost of goods sold, plus legal, patent and general expenses and taxes, was		11,759,857.08
		$1,555,810.04
Less interest on debentures in excess of interest and dividends received	$16,459.40	
Sundry losses	27,178.31	
Depreciation on inventories and consignments	123,204.87	166,842.58
Leaving		$1,388,967.46
There is charged off, in writing down factory plants, patents, etc., the sum of		511,321.97
Leaving net		$877,645.49

SALES DEPARTMENT.

Attention is called to the report of the first vice-president, covering the operation of this department. From this report it will be seen that more than 90 per cent of all the sales for the year were on the basis of cash within 60 days from shipment. The organization of this department is most excellent and effective, and the total expenses of selling and distributing the products of your factories during the past year have been materially less than for any previous year.

MANUFACTURING AND ENGINEERING.

By referring to the report of the third vice-president, in charge of manufacturing, much information will be gained as to that important branch of your business. Your directors are fully alive to the necessity of maintaining in this department the highest possible standard of economy and efficiency, and they believe that the results so far attained in this direction are of the greatest value and importance. The achievements of your company in notable installations, involving the highest class of engineering and mechanical skill, have been especially gratifying.

ARRANGEMENT WITH THE WESTINGHOUSE COMPANY.

Since the close of the fiscal year a contract has been concluded with the Westinghouse Electric and Manufacturing Company, which embodies a recognition of the patents of each company by the other and the right, subject to certain exclusions, to a joint use thereof. An official notification of this contract was given out on March 13, and since then details necessary to make the arrangement effective have been concluded. It is believed that many advantages will be derived from this contract, specially in eliminating much costly litigation, and in the important relations of co-operation in engineering and manufacturing methods.

PATENT LITIGATION.

The suits on the Van Depoele electric railway patents have progressed practically to a conclusion. In one case—that against the Elmira & Horseheads Railway Company—the United States Court of Appeals for the Second Circuit has rendered a decision finally sustaining the patent involved in that suit, and giving it a construction which brings within its scope the standard devices universally used for switching electric cars having an overhead trolley. In this suit were also sustained other claims of substantial importance.

In the suit against the Winchester Avenue Railroad Company, the Circuit Court of the United States for the Second Circuit has sustained the main Van Depoele trolley patent, giving it a construction which brings within its scope the standard overhead trolley cars in general use. These decisions are regarded as of great importance, and we believe that the above named patents, having now been established by the courts, will prove of substantial value to the company.

Suits on other patents in the railway and lighting field are pending, and are being actively pushed. Some of these will come to a hearing during the coming year.

A number of valuable patents have been acquired by the company during the past year.

GENERAL CONDITIONS.

The prices of your company's products have undergone excessive shrinkages in the adverse conditions of the past three years, and the securities held by it in local companies which were constructed upon the high prices of the past depreciated in like degree during the panic of 1893 and in the year subsequent thereto. Greatly modified valuations of your various assets have thereby been made necessary from time to time, and much information relating thereto has been brought to your attention in former reports.

It is believed that the necessity of further reduction of aggregate values will not arise, nor is it expected that the market prices of your products can suffer any substantial decline in the early future. The local enterprises in which your company is interested as a creditor or security-holder are, as a rule, returning to normal conditions. Many of them give promise of greatly increased prosperity.

Similarly the inventories and other investments of your company are in such shape as to lead your directors to anticipate no shrinkage therein beyond that for which provision has been made. In the meantime the varied applications of electricity are increasing, and the output of the company's works should be augmented as a result of the added uses to which electrical apparatus is almost daily being put.

It will be noticed, by referring to the profit and loss statement, that the revenue derived by your company from interest and dividends for the past year was nearly sufficient to provide for the interest on its outstanding debentures.

By order of the board of directors.

C. A. COFFIN, President.

PERSONAL.

Mr. Samuel Insull, president of the Chicago Edison Company, visited New York city last week.

Mr. J. H. Reid, of the Westinghouse Glass Factory, Pittsburgh, visited New York city last week.

Mr. E. M. Scribner, formerly with the Western Electric Company, of Chicago, has associated himself with the Bryant Electric Company, of Bridgeport, Ct.

Mr. William Arnot, Mr. Philip Martin, Mr. Michael Duffy and Mr. John McKenna, underground cable experts, have resigned from the Standard company and have made arrangements with the National Underground Cable Company, of New York city. Each of these men has had a long experience in underground and aerial cable construction work of all kinds, including street railway, electric light, telephone and telegraph cable, and are well known for their ability in their lines, and are a valuable addition to the National company's already large force. The National company's construction department is now one of the largest in the country, and is in a position to handle any work, no matter how large, with promptness and dispatch.

Electric Plant for Lima, Peru.

The South American Light, Power and Traction Company, of Lima, Peru, has just placed a contract with the General Electric Company, of New York, for the installation of a 5,000-horse-power electrical plant. The dynamo will be erected at the waterfalls, 11 miles from Lima, and the electric power generated will be transmitted to the city, where it will be used to operate the surface railways and electric lights and furnish to the public generally such electric power as may be required. This will be the largest electrical installation in South America.

Commercial Electric Company Burned Out.

The factory of the Commercial Electric Company was destroyed by fire on April 20. The company has secured a new factory and is prepared to fill orders.

EXPOSITION NOTES.

DESCRIPTION OF THE VARIOUS PROPOSED EXHIBITS AND NAMES OF THE REPRESENTATIVES.

The Stirling company, Chicago, will make an exhibit of the well known Stirling water-tube safety boilers.

The Crouse-Tremaine Carbon Company, Fostoria, Ohio, will show their solid and cored carbons. Mr. H. Stillson Hart will have charge of the exhibit and Messrs. Crouse and Tremaine will visit the Exposition.

Mr. Thos. R. Mercein, of Milwaukee, secretary of the Northwestern Electrical Association, has been appointed by the board of that association to represent it at the convention of the National Electric Light Association, which will begin in New York city May 4.

The Williamsport Wooden Pipe Company intend to have an attractive exhibit of their product. They manufacture creosoted wooden conduits, made under the Chesnut patent. Mr. J. M. Chesnut, the patentee, and Manager N. B. Bubb will be in attendance.

The Wilkinson Manufacturing Company will have in operation two of their automatic mechanical stokers in connection with the Abendroth & Root boilers. These boilers furnish steam for the Exposition. Mr. A. Wilkinson will be in attendance in person, as well as others, from time to time.

The Walker company, of Cleveland, will have a lot of new apparatus, including a controller that is expected to attract attention. The exhibit will be in two parts, on the main floor and in the basement, where a dynamo for supplying a portion of the incandescent light for the Exposition will be located.

The Holtzer-Cabot Electric Company, of Boston, will exhibit dynamos, motors, motor generators, controllers, indicators, etc., as well as a supply of house goods, such as annunciators, burglar alarms, gongs, watchman's time detectors, etc. Mr. David Chalmers, Mr. De Lue and President C. W. Holtzer will be in attendance.

The Diamond Electric Company, Peoria, Ill., will exhibit full lines of their alternating-current wattmeters and new Scheefer transformers. The meters will be operated under a dial glass, so as to show the working parts, and tests will be made to demonstrate their sensitiveness. Messrs. Francis, Sheldon and Scheefer will attend the Exposition.

Mr. Stanmore will represent A. K. Warren & Company, who propose showing their methods of repairing armatures, their manufacture of commutators, also woven-wire brushes and new style brush-holders. They will show the working exhibit of the tool or mechanism used in turning down and smoothing rough commutators without removing the armatures from the fields.

DeVeau & Company, of New York, will be represented by Mr. DeVeau in person and the exhibit will consist of telephone switchboards, long-distance telephones for exchange use, telephones for factories, offices, etc., and transmitters, receivers and all parts and necessary supplies for exchange use and general telephone work. This will be a thoroughly up-to-date telephone exhibit.

The exhibition of the American Electric Heating Corporation, of Boston, Mr. James I. Ayer, general manager, will consist of a complete line of cooking utensils which will be in practical use during the entire period. In addition to this there will be a full assortment of laundry irons, tailor gooses, glue pots, pitch kettles, office radiators and heaters and car heaters.

Siemen & Halske Electric Company of America will exhibit a 100-kilowatt direct-connected machine of their "I" type. This machine will be run in connection with a Ball & Wood engine, the whole being part of the large order received for the Siegel-Cooper building. After the exhibition this machine and engine, with seven others, will be placed in the Siegel-Cooper building, making up their electric plant.

Cornell University is in possession of the Gramme dynamo built by Professor W. A. Anthony as early as 1876, and exhibited as a great curiosity at the Centennial Exposition of that year. It was used for arc lighting and for a great variety of purposes in those early days. It has remained in use ever since, and Dr. E. L. Nichols writes that even now they are using it at the university. Other very early dynamos are to be shown.

John A. Roebling's Sons Company will exhibit some sample boards showing the various kinds of insulated wires which they manufacture. They propose to have it exhibited in a booth, which will be in charge of Mr. W. L. Doyle, and associated with him will be Mr. M. R. Cockey, of the New York office, and Mr. Robert Welch, of the Trenton office. The booth will be furnished as an office, rather than as a show-room for the exhibition of their goods.

The Chapin-Douglas Electric Company, of New York, will exhibit one of Evanson & Armpriester's latest switchboards showing arrangement of the latest details in switchboard work; also the Perfection dynamo brush, made of copper wire gauze and wound so that contact is made on the ends of all the wires. To illustrate the ventilation of this brush it is only necessary to blow the breath through it. The new C.-D. rosette will be shown and also Burnley's soldering paste. Burnley's soldering paste is non-corrosive, as it contains no acid and makes an excellent joint.

An exhibit that is sure to arrest the attention of the numerous visitors to the Exposition will be that which shows a stock ticker system in full working operation. The executive of the Gold and Stock Telegraph Company has generously authorized its superintendent and electrician, Mr. Geo. B. Scott, to place at the disposal of the Exposition management a number of old instruments that will be useful in showing how the system as it exists to-day has been worked out to its present stage of efficiency and celerity. Mr. Edison and others are also contributing apparatus of this nature, rendering the display one of unusual value, as such electrical machinery has never been brought together before in this instructive manner.

The Adams-Bagnall Electric Company intend to have a very comprehensive exhibit of arc lamps. One each of the following style of lamps will be shown in running condition: Black Japan series lamp, shunt; 17thCentury brass series lamp, differential; oxidized copper 100-hour lamp, aluminum 100-hour lamp, yellow brass alternating lamp, 1,600 alternations; Japanese copper alternating lamp, 7,200 alternations; oxidized silver constant-potential lamp, oxidized brass constant-potential lamp, marine lamp, black Japan; 100-hour old gold lantern. They will also have one nickel railway lamp to run nine or ten in series on the railway circuit. The arc lamps will be of the improved "A-B" patent. The "A-B" incandescent lamp will also be shown.

In spite of many pressing engagements, Prof. Elihu Thomson is kindly preparing for the National Electrical Exposition a very interesting personal exhibit. He hopes to ship it to New York from New England in a few days. He has been requested by the management to include in it some of the working apparatus illustrative, in many beautiful ways, of the "repulsion phenomena," his classic investigation of which some years ago is well remembered by all electricians. An endeavor will also be made to secure a lecture from him during the Exposition, as it is understood that he will be in New York at that time and is one of the most successful lecturers of the day in explaining electricity popularly and clearly. A bust of Professor Thomson is now being made by the Riccinilli Brothers, of New York, under the direction of the sculptor, Mr. Robert Kraus, of Boston. It is expected to be finished by the end of the month, and the original has consented to its inclusion in the collection of busts and pictures that will adorn the space of the loan and historical exhibit committee.

The Electric Storage Battery Company, of Philadelphia, will have a storage battery of 128 cells in operation, capable of supplying 400 sixteen-candle-power lamps (suitable either for central stations or isolated plants) used in conjunction with the Edison system, charged during hours of light load, when current is supplied at a special rate. They will exhibit in addition the following:

Motor-driven booster for charging battery in connection with the Edison system, built by the Electro-Dynamic Company, Philadelphia, Pa.

White marble switchboard in oak cabinet, showing latest type of controlling apparatus for storage battery work.

Electric carriage propelled by storage batteries, designed by Morris & Salom, similar to carriage which won the gold medal in the Chicago road race.

Electric launch, 21 feet, propelled by storage batteries, handsomely finished with mahogany and natural wood.

The exhibit will be in charge of Mr. Chas. Blizard, assisted by Messrs. R. W. Rundle, W. O. Knudson and T. B. Entz.

The exhibition of the Babcock & Wilcox company at the National Electrical Exposition to be held in New York from May 4 to May 30, 1896, will consist of a steam drum, composed of open-hearth steel throughout, with forged steel heads and cross-boxes; a number of standard Babcock & Wilcox sections, composed of four-inch tubes and forged steel headers, with forged handhole fittings; a forged-steel header, showing method of expanding tubes; a cross-box and other examples of steel forgings made by this company; a model of the boiler as now constructed for very high pressure will be shown, as well as the original inventor's model of the Wilcox design of 1856.

The exhibit is intended to emphasize the fact that high-pressure steam is the demand of the times, especially in the electrical industries, and that the Babcock & Wilcox company are prepared to meet this demand with a boiler built entirely of rolled and forged steel, that shall be safe and economical at any desired pressure. The company will be represented by Messrs. H. F. Howlett, W. D. Hoxie, E. H. Peabody, W. J. Reilly and E. H. Wells.

A COLLECTION OF INVALUABLE MORSE RELICS.

Mr. E. L. Morse, one of the members of the Historical and Loan Exhibit Committee, has prepared a remarkably interesting collection of early papers, models, relics, etc., relating to Morse, Vail, Henry, O'Reilly, L. D. Gale and others and to the early days of the telegraph. As the son of Prof. S. F. B. Morse, he has, of course, facilities enjoyed by no one else for the presentation of such matter, and the result of his efforts will be of great attraction to everybody. It is hoped that this collection will be supplemented by other material from other contributors. The list furnished by Mr. Morse is as follows:

1. Copy of the first wooden telegraph apparatus.
2. Certified copy of the Sully sketch-book.
3. Original pen and pencil notes of Morse relating to the telegraph.
4. Letters of Alfred Vail relating to the telegraph.
5. Letter of Peter Cooper.
6. Letter of Cyrus Field.
7. Original 1843 contract of Alfred Vail with Professor Morse.
8. Piece of shore end of Atlantic cable.
9. Pocket telegraph instrument presented to Professor Morse by J. D. Caton.
10. Decorations and medals received by Professor Morse from European governments.
11. Marble bust of Professor Morse by Horatio Greenough.
12. Portrait of Professor Morse by Edward L. Morse.
13. Frame containing the following photographs: Birthplace of Professor Morse, in Charlestown, Mass.; church where Morse was baptized; residence, Poughkeepsie; residence, New York; University Building, New York; Academy of Design; copy of "Dying Hercules;" statue in Central Park; monument in Greenwood cemetery.
14. Letter of S. F. B. Morse, written to his parents in 1799, when Morse was eight years old.
15. First picture painted by Morse, at the age of 15. A family group of his parents, his brothers and himself.
16. A few of Professor Morse's sketch books.
17. Daguerreotype of Professor Morse and his eldest daughter, taken by himself in 1840 or 1841; one of the first ever taken in America.
18. Letters from George Wood, Henry O'Reilly, Amos Kendall, Prof. L. D. Gale, William W. Pell, Prof. Benjamin Silliman and others.
19. Caveat for a mode of filling pipe with wire (Ms.).
20. Miscellaneous papers, etc.

AN EXHIBIT OF GEDNEY CHANNEL BUOYS.

One of the most picturesque features of New York harbor at night

is the lane of electrically lighted buoys that marks the passage through Gedney Channel at Sandy Hook. This is a unique installation, the current being supplied to the buoys from the shore through long runs of submarine cable. These buoys are huge spars of wood, 60 feet long, floating at a slight incline from the vertical, the lamp being carried like the head of a walking stick, and the submerged end being anchored by an iron mushroom weight. The United States Lighthouse Board has kindly placed two of these buoys, ready for lighting, one direct current and one alternating, at the disposition of the Exposition management. They will be shown in a length of 12 feet, upright, and the Bishop Gutta-Percha Company has been good enough to offer runs of cable to carry current to them, of the same type as that actually supplied for the real work. These buoys will be placed near the entrance to the Exposition, with charts and pictures, and the visitor will thus be able to understand how the thing works. Such an exhibit has never been made before, and, as stated already, thus far there is only one such installation in the world.

The announcement has been made of the generous offer of the Western Union Telegraph Company of two wires from Niagara, with which to bring current from the power plant there to run the model of the plant at the Exposition. These wires will be available in the evening, and the question thus arose as to what should be done in the way of running the model the rest of the time during each day. Mr. A. S. Brown, the electrical engineer of the Western Union Telegraph Company, suggested that it would be a comparatively easy thing to ship a few storage batteries up to Niagara, charge them there and bring them down for the purpose. This simple but shrewd suggestion has been acted upon, and the Electric Storage Battery Company, of Philadelphia, through Mr. Chas. Blizard, its representative in this city, has placed at the disposal of the Exposition all the batteries that may be needed, with the permission that this stored Niagara energy can also be turned loose on any other exhibit at will. There will thus be exhibited the energy of Niagara in a "live" form, coming over the wires in the shape of an alternating phase current, to drive the model by a phase motor, and the stored Niagara energy, which will, of course, be applied to a direct-current motor, which will also run the model part of the time. A more interesting illustration of the flexibility of electrical power transmission than this could hardly be desired, as it practically embraces the whole field of modern methods and appliances.

THE INTERESTING LOAN EXHIBIT FROM CORNELL UNIVERSITY.

Dr. E. L. Nichols, of Cornell University, furnishes the subjoined list of the valuable and important apparatus, much of which is of historical as well as experimental interest, to be sent to the Exposition. Professor Moler is to set it up there. As will be seen from the explanatory notes, the apparatus is such as permit of a repetition of some of the investigations at the Exposition, where they will be greatly enjoyed, not only by the public, but by experts. The exhibit comes specifically from the Department of Physics and Electrical Engineering of Cornell University.

1. Gramme Machine mounted upon Brackett cradle. Constructed in the shops of Cornell University by Prof. W. A. Anthony in the Summer of 1875, exhibited at the Centennial Exhibition, Philadelphia, 1876, and at the World's Fair, Chicago, 1893. Capacity, five arc lights, each with 20 amperes. It was in almost constant service from 1875 to 1893, and is still in good order. It was the first machine of the Gramme type built in America. The cradle upon which it was mounted was one of the earliest examples of the Brackett dynamometer, and was designed and constructed especially for this dynamo. It reads in kilograms per revolution.

2. A Reversing Switch. For use with primary batteries. Designed and constructed by Professors Anthony and Moler for lecture room use in 1875. (Original model.)

3. A "Doubler," or electrostatic accumulator, involving the principle of the electriphorus. Designed and constructed by Professors Anthony and Moler in 1878. (Original model.)

4. Arc Lamp for Projection. (Focussing.) Designed by Professor Anthony, and constructed for him by the Brush Electric Company in 1887. One of the early attemots to simplify the mechanism of direct-current arc lamps. (Original model.)

5. Small Double-Coil Tangent Galvanometer. Designed by Professor Anthony and constructed by Fred C. Fowler in the workshops of the Department of Physics. It was intended for the absolute measurement of electro-motive forces. (1884. Original.)

6. Early Form of Alternating Current Dynamo. For experimental purposes. Designed by D. C. Jackson and constructed by Fred C. Fowler about 1885. (Original.)

7. Swinging-arm Galvanometer. Designed by Professor G. S. Moler and constructed by Fred C. Fowler. (1888. First described before the American Institute of Electrical Engineers, May 16, 1888, Vol. V. Original.)

8. Revolving Drum. Constructed by Professors E. L. Nichols and W. S. Franklin for studying the direction of the electric current. It was driven during the investigations at the rate of 400 revolutions per second. (*American Journal of Science*, Vol. 37, p. 103, February, 1889. Original.)

9. Ryan Electrometer. The original instrument with which Professors Merritt and Ryan conducted their experiments upon transformers in 1889. (American Institute of Electrical Engineers, Vol. V., p. 6, 1889.)

10. Spiral Coil Voltmeter. A much used copy of the original instrument designed and constructed by Professor H. J. Ryan, 1889. (Described at American Institute of Electrical Engineers, May 22, 1889, Vol. VI.)

11. Horizontal Slit Photometer. Designed by Professor E. L. Nichols and constructed by F. C. Fowler, 1890. This instrument was intended for the study of the spectrum of artificial light directly upon the photometer bar, and has been much used in such work. (American Institute of Electrical Engineers, May 21, 1890. Original.)

12. Discharger used by Messrs. Archbold and Teeple in the study of the Ball and Point Effect. A peculiar form of alternating arc discharge. (See *American Journal of Science*, Vol. XLI, 1891. Original.)

13. Alternate Current Potentiometer. Designed and constructed by Professor G. S. Moler in 1891. It takes the place of an alternate circuit voltmeter, and gives results accurate to within 0.1%. (American Institue of Electrical Engineers, May 21, 1891. Copy of the original.)

14. Curve-writing Voltmeter. Designed by Professor G. S. Moler and constructed by F. C. Fowler, 1892. This instrument, which was used to record the rapid fluctuations of current and potential met with in dynamo practice, etc., was described at the American Institute of Electrical Engineers, June 6, 1892. It has been superseded by the galvanometer of Hotchkiss and Millis, No. 22 of this collection. (Original.)

15. Experimental Transformer. Designed by Professors Bedell and Crohoro, 1891, for special investigations of the transformer, with particular reference to effects produced by an alternation of the reluctance of the magnetic circuit. This transformer was used in the experiments of Professor Bedell on the experimental determination of transformer diagrams. (Proceedings of the International Electrical Congress, Chicago, 1893. Original.)

16. Automatic Printing Speed Counter for Dynamo Shafting. Designed and constructed by Prof. G. S. Moler, 1893. The apparatus exhibited, which is the original model, has been in continuous service since 1893. (American Institute of Electrical Engineers, May 17, 1893.)

17. Apparatus for Studying the Heating of Armatures. Designed and constructed by Messrs. A. H. and C. E. Timmerman, 1893. For the investigations performed by means of this apparatus, see American Institute of Electrical Engineers, Vol. X.

18. Alternating Current Dynamo, constructed in the shops of Cornell University by Messrs. Smith and Hall. (Original.)

19. Water Jet Instantaneous Contact Maker. Designed by Professors Bedell and Ryan and constructed by F. C. Fowler, 1893. This instrument is used in the study of transformers and other alternating current investigations where the instantaneous values of the varying currents and electro-motive forces are to be determined. (American Institute of Electrical Engineers, October 18, 1893. Original.)

20. Wooden Drum with coils of wire, used in the experiments of Professors Nichols and Franklin upon the condition of the ether surrounding moving bodies. The drum, which was constructed with a galvanometer capable of indicating a current of six by ten amperes, was driven at 3,600 revolutions and suddenly stopped. Such was the delicacy of the apparatus that the absence of effect upon the galvanometer served to show that less than one hundred thousand million millionth of the rotating coil depended upon the rotation of the ether produced by its rotation. (*Physical Review*, Vol. 1, p. 426, 1894.)

21. Phase Indicator for Alternate Current Motors, etc., designed and constructed by Professors Moler and Bedell, for determining the changes in the armature lag of alternate synchronous motors under varying conditions. (Described before the American Institute of Electrical Engineers, May, 1894.) This instrument was employed in the experiments upon the synchronous motor described by Professors Bedell and Ryan. (See Journal of the Franklin Institute, March, 1895. Original.)

22. Hotchkiss and Millis Galvanometer for the Photographic Recording of Alternating and Oscillatory currents.

23. Set of Negatives obtained with the Hotchkiss and Millis galvanometer.

24. Laboratory Transformers. Designed and constructed by Messrs. J. J. Swann and H. E. Mole, 1896. This transformer is one of a number constructed in the laboratory with particular reference to students' use. (Original.)

25. Apparatus for the Measurement of Telephonic or Minute Alternating Currents. This exhibit is the original dynamometer used in making telephonic current measurements with the polyphase current method devised by Professor H. J. Ryan. (The *Electrical World*, June 23, 1894.)

26. Two-phase Rectifying Commutator used by Messrs. Barnes & Stillwell, under the direction of Prof. H. J. Ryan to determine the utility of inductance for constant current regulation from "open coil" or other forms of polyphase generators.

27. Sample of Sheet-iron formed as desired by etching process, applied by Prof. H. J. Ryan, for the productions of laminated portions of experimental alternate current machinery, avoiding the use of dies too expensive for experimental purposes.

28. Alternate Current 200-Ampere Balance, in which the flexible connections are made of silver foil, designed by Prof. H. J. Ryan and constructed in the workshops of Cornell University by Messrs. Tobey and Walbridge, 1890.

29. The Original Westinghouse 10-Light Transformer and Switchboard, used by Professors Merritt and Ryan while making their transformer experiments in 1889. (American Institute of Electrical Engineers, Vol. V., p. 6, 1889.)

30. Special Form of Mechanical Contact Maker for obtaining alternate current curves. Used by Prof. H. J. Ryan when determining the behavior of a 17,500-watt transformer in 1892. (*Electrical Engineer*, New York, September 28, 1892).

31. Photographs of a 30,000-volt, 10-kilowatt transformer, stepping up from 100 volts at 50 p. p.'s. Designed and constructed in the workshops of Cornell University by H. B. Plumb, 1895. (Described in the Sibley *Journal of Engineering*, June, 1895.)

ELECTRIC LIGHT FLASHES.

The Edison Electric Illuminating Company, Boston, is to have a storage battery plant in the Back Bay, west of Massachusetts avenue. It will be used as an auxiliary to supply the eastern part of the Back Bay district.

Lexington, Ky., is in quite a muddle over its street lighting. The bids recently received are declared illegal, and a municipal plant may be built. The city is lighted on the moon schedule, the gas company lighting the inner portion of the city and the Central Electric Light Company lighting the outlying districts with incandescent lights. The cost is thought to be too high.

There is talk of consolidating the municipal electric light plant with its competitor in Springfield, Ill. The *Register*, of that city, says: "Putting this and that together there seems to be justification for the belief that the municipal plant as a public benefaction is in danger. The city may lose the money it has invested in the plant if the City Council does not exercise careful supervision of the matter.

At a meeting of the stockholders of the Brush Electric Light Company, of Rochester, N. Y., these directors were named: J. Lee Judson, William Runkle, Albert H. Harris, George W. Archer, Frederick Cook, Harry L. Brewster, Granger A. Hollister and George C. Hollister. The same directors were elected for the Rochester Gas and Electric Company, at a meeting held at the same time and place.

An order of one-half a million arc light carbons, placed with the American Carbon Company, of Noblesville, Ind., by the Cleveland Electric Illuminating Company, has caused consternation in the carbon alliance, which has its headquarters in Cleveland, Ohio. These carbons were said to have been sold strictly on their merits in competitive tests with the National and Brush companies' brands. The placing of this order is said to have disturbed the Cleveland carbon men to an extent never before known, as it was taken right from under their noses in their own bailiwick.

Through an amendment to the electric light ordinance at Albany, N. Y., the maximum price has been brought down to 30 cents. This amendment was made upon the strength of the further concession made by the Albany Electric Illuminating Company, which agrees to light, free of cost, the entire city building, including all the offices, rooms and corridors. Under the ordinance as originally proposed it was stipulated to furnish lights for the several city offices only. It is estimated that the free lighting will bring the 32-cent rate as first fixed down to 30 cents. The difference in the cost at the present rate of 39½ cents and at the proposed 30-cent rate will amount in 10 years to nearly $216,000.

An Electrical Fancy.

The astonishing progress of electrical science is neatly satirized by a Parisian paper, which imagines Mr. Edison in his laboratory hearing the news of a declaration of war between Great Britain and the United States, says the *Youth's Companion*. A young man, his assistant, rushes in, pale and out of breath, and exclaims to the great electrician:

"Oh, master, war is declared! It is terrible!"

"Ah!" says the master. "War declared, eh? And where is the British army at this moment?"

"Embarking, sir,"

"Embarking where?"

"At Liverpool."

"At Liverpool—yes. Now, my friend, would you please join the ends of those two wires hanging there against the wall? That's right. Now bring them to me. Good! And be kind enough to press that button."

The assistant, wondering and half amused, presses the button.

"Very well," says the inventor. "Now do you know what is taking place at Liverpool?"

"The British army is embarking, sir."

The inventor pulls out his watch and glances at the time. "There is no British army," he says, coolly.

"What?" screams the assistant.

"When you touched that button you destroyed it."

"Oh, this is frightful!"

"It is not frightful at all. It is science. Now, every time a British expedition embarks at any port, please come and tell me at once. Ten seconds afterward it will simply be out of existence, that's all."

"There doesn't seem to be any reason why America should be afraid of its enemies after this, sir."

"I am inclined to believe you," says the master, smiling slightly. "But in order to avoid future trouble, I think it would be best to destroy England altogether."

"To—to destroy England, sir—"

"Kindly touch button number four there."

The assistant touches it. The inventor counts 10.

"—eight, nine, ten—it is all over. There is no more England!"

"Oh! Oh!" screams the young man.

"Now we can go on quietly with our work," says the master. "And if we should ever be at war with any other nation, you have only to notify me. I have an electric button connected with every foreign country which will destroy it when pressed. In 10 minutes I could destroy every country in the world, the United States included. Be careful, now, that you don't touch any of those buttons accidentally—you might do a lot of damage!"

Arrangements have been made for the immediate transfer of the W. S. Hill Electric Company's machinery from Boston to New Bedford. The plant has been running in the interest of the newly formed company for the past three months.

TELEPHONE NEWS AND COMMENT.

The Alabama Telephone and Construction Company has closed its exchange at Selma, Ala., as it was not paying expenses.

The Western Telephone Construction Company informs the ELECTRICAL REVIEW that it has just closed a contract with the Fort Wayne, Ind., Telephone Company, for an equipment of 2,000 telephones, 1,000 of which are to be shipped immediately.

The output of the American Bell Telephone Company for the month ending April 20 was as follows: Gross output, 21,525, against 18,794; returned, 6,330, against 6,253; net output, 15,795, against 12,541. Since December 20: Gross output, 76,518, against 50,157; net output, 47,056, against 24,932. Total outstanding, 724,592, against 607,438 last year. This is the largest month's output in the history of the company.

The Postal Telegraph Company has filed articles of incorporation with the Secretary of State of Arkansas. The local capital is placed at $1,000, but the right is reserved to increase it to $1,000,000. This is the first entrance of the Postal company into Arkansas. Its first line will be from Little Rock to Benton, but will be extended through the State. There is a possibility that the company will use the wires of the Erie Telegraph and Telephone Company.

Mr. E. J. Hall, Jr., vice-president and general manager of the American Telephone and Telegraph Company, has very kindly loaned to the National Electrical Exposition the original long-distance telephone set with which, some years ago, Prof. Alexander Graham Bell opened the line between New York and Chicago. It has since that time been jealously guarded, and has had a silver plate put upon it with the inscription as to date, etc. Mr. Hall accompanies this with a large picture, illustrative of the event, and with other material bearing upon the occasion. Mr. C. R. Truex has been intrusted with the care and arrangement of this interesting exhibit, which goes in the collection of the Historical and Loan Exhibit Committee.

The apparatus for the new telephone exchange at Richmond, Va., to the number of 2,000 telephones and switchboard capacity, is being supplied by the Western Telephone Construction Company, of Chicago. The new multiple switchboard being furnished to Richmond is the latest improvement in modern telephony. Mr. Keelyn, who designed the system, states that for large exchange work these switchboards will be the most rapid and effective of anything heretofore known. He states that no more movements are required to reach any subscriber in the system than is required with the Western No. 1, for small exchanges, which is claimed to be the most rapid and effective switchboard yet put into practice. The Richmond contract is claimed to be 25 per cent larger than any heretofore closed by the independent telephone companies for apparatus.

ELECTRIC RAILWAY NOTES.

Employés of the Milwaukee Street Railway Company have prepared a demand for an increase in wages from 19 to 21 cents per hour, dating from May 1.

The Baltimore Traction Company is negotiating a loan of $800,000, to pay off indebtedness and add to its equipment. A large shop for repair work is to be built.

The Nassau company, of Brooklyn, states that, including transfers, its lines carried 200,000 passengers on Sunday, April 19. This is a pretty big business in five-cent pieces.

The sale of the Nashville Traction Company under foreclosure proceedings has occurred, and the road was bought in by bondholders at the par value of their holdings, $100,000.

How is this? A Chicago paper states that the General Electric Railway Company, of that city, has decided to use compressed air as the motive power! Perhaps it is the powerful Chicago air.

The boiler of the Buffalo, Kenmore & Tonawanda, N. Y., Electric Railroad Company power house blew up on April 17, causing damage that will delay traffic on the road for two weeks. One was injured.

The expenses for the settlement of the Adamson suit to annul the franchise of the Nassau Electric Company that had been in the courts for some time will be paid by Messrs. Tom. L. and Albert Johnson, the owners of the Nassau company.

The Metropolitan Railroad Company, of Washington, D. C., has filed its answer to the suit for injunction brought by the Capital Traction Company to prevent the former laying its underground system on Florida avenue. The Metropolitan company denies that the Capital Traction Company owns the double track on the right of way referred to, and also any intention to injure the complainant. It states that it is fully authorized by law to build its proposed road over the ground.

A gentleman who has kept close watch of transit problems in New York says: "I have investigated carefully and am satisfied that the offer to buy or lease Manhattan Elevated has come from a syndicate represented by Edward Lauterbach and including the Third Avenue Railroad Company, the Brooklyn Elevated Railroad Company and prominent politicians. What is more, I think that they will lease the Manhattan Elevated road. It would be comparatively easy for such a combination to secure rights to build routes and extensions, cross the Brooklyn Bridge, etc., and there is no doubt whatever of an enormous saving in operating expenses if the elevated lines are electrically equipped. Travel would be increased materially, and with the improvements and savings the lessees of Manhattan, even at eight per cent, would, in my judgment, have a very profitable acquisition."

OUR CANADIAN LETTER.

SUDBURY, ONT. — Sudbury will spend $10,000 on electric light.

BRANTFORD, ONT. — A company has been formed at Brantford to manufacture the Callender automatic telephone.

MONCTON, N. W. T.—The organization of the Moncton Street Railway, Heat and Power Company was called for April 3.

ST. STEPHEN, ONT.—Under Jos. McVey, the extension of the St. Stephen, Ont., & Milltown Railway is making good progress.

HARROW, ONT.—The South Essex Electric Railway Company applies for an Ontario charter to build from Amherstburg to Harrow, Ont.

HAMILTON, ONT.—A new incandescent light company, of which Mr. Noble is manager, is getting into shape for business in Hamilton.

OTTAWA, ONT.—An electric railway is projected to extend from Bell's Corners to Richmond, West, a distance of 10 miles. John Moodie is one of the promoters.

CAMPBELLTON, N. B.—The Campbellton, N. B., Electric and Telephone Company are enlarging their plant and are contemplating extension to Dalhousie.

WESTPORT, ONT.—The village of Westport is making application for incorporation. A system of electric lighting is in contemplation as well as other improvements.

ST. CATHERINES, ONT.—The St. Catharines Street Railway Company is making a number of improvements, new rails and new overhead cables and brackets being put on.

NIAGARA FALLS, ONT.—The Niagara Falls Park and River Electric Railway carried last year 499,015 passengers, which is a large increase over 1894. The receipts were $65,784, and cost of operation $40,630.

ST. CATHARINES, ONT. — The Citizens' Light, Heat and Power Company, of St. Catharines, Limited, applies for an Ontario charter. Capital, $40,000. The provisional directors are W. Cooke, Annie Cooke and W. H. Phillips.

SHERBROOKE, QUE.—J. E. Flood and J. W. Burke, of New York, were in Sherbrooke recently to make final arrangements with the City Council and R. W. Heneker for the commencement of the electric street railway in that city.

TORONTO, ONT.—For some time negotiations have been pending for the purchase of an electric railway franchise on the Niagara Peninsula. It is said that a syndicate composed of capitalists from Toronto, Montreal and New York is now being formed to secure the franchise, the intention being to build the line at once.

BROCKVILLE, ONT.—A meeting of the directors of the Brockville Street Railway Company took place the other day when the agreement with the town was formally ratified. According to the agreement work is to be commenced on the construction of the railway not later than May, 1897, one mile to be completed and in operation a year from that date.

QUEBEC, QUE.—Capitalists from the United States, including J. N. Brown, of Baltimore, president of the Maryland Trust Company; J. Shear and W. J. McCracken, of New York, and F. O. Blackwell, C. E., are interested in the Quebec Electric Street Railway scheme. The absorption of the electric light company's plant and the Quebec, Montmorency & Charlevoix Railway is contemplated.

MONTREAL, QUE.—The Canadian Electric Railway and Power Company, which proposes to build an electric line from Montreal to Windsor, has had its application refused by the Railway Committee of the Dominion Parliament. Efforts are being made to restore the bill to the order paper. The promoters, who are chiefly Toronto capitalists, are George W. Beardmore and W. H. Cawthra, Toronto; James K. Osborne and Lyman M. Jones, Winnipeg.

HAMILTON, ONT.—The promoters of the Hamilton Radial Electric Railway Company have secured right of way over the beach, crossing the canal by the new government bridge on the other side of Hamilton Bay. It is the intention of the company to start building early in the Spring and to have the line completed as far as Burlington in June. The officers of the company are: Alex. Turner, president; Thos. Leather, vice-president; W. W. Osborne, secretary; W. A. Wood, treasurer. Directors: A. Zimmerman, Geo. Lynch Staunton and John Moodie.

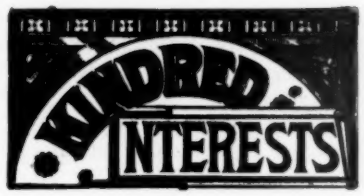
MONTREAL, QUE.—Electric railway building will be brisk this Summer on the island of Montreal. Over 30 miles of track are to be laid by the Montreal Park & Island Railway Company. A syndicate has agreed to take that company's bonds and build the road, and furnish rolling stock and everything necessary to complete the equipment of the line. The system will comprise seven miles of double track to Lachine, seven miles to St. Laurent, four miles to St. Vincent de Paul, including a bridge over the Back River, to cost $20,000. Mr. Reid is at the head of the syndicate. J. A. C.

Montreal, April 25.

Professor Roentgen's New Discoveries.

[Cable to the Sun, New York, April 26.]

Professor Roentgen has published several important new discoveries connected with the X rays. He has ascertained that all solid bodies can generate them under the influence of cathode rays, the only difference being as regards intensity. The most intense are produced by platina. He further says that the insertion of the Tesla apparatus between the ray-producing apparatus and the Ruhmkorff apparatus is highly advantageous. He has made several experiments which confirm his observation that X rays can discharge electric bodies, and that air illuminated by the rays can do the same. He further declares that electric bodies surrounded not by air, but by hydrogen or by highly rarefied air, are also discharged by the rays, though much more slowly.



The Helios Electric Company, of Philadelphia, have just issued a neat little pamphlet describing their Standard alternating and direct-current arc lamps.

The Okonite Company, Limited, after May 1 will be located in Rooms 412, 413 and 414 Postal Telegraph Building, 253 Broadway, New York city. The old building at 13 Park Row is to be torn down, thus necessitating the Okonite company's removal.

Among the orders for gas and electric light fixtures received the past week by Messrs. McKenney & Waterbury, Franklin street, Boston, Mass., were over 40 private residences from Maine to California, also a large order for the Stewart House, Broadway, New York city.

The Board of Managers of the Ohio State Reformatory have awarded the Card Electric Company, of Mansfield, Ohio, the contract for two direct-connected multipolar generators, capacity 66 kilowatts each, speed 250 revolutions per minute, for use in the Ohio State Reformatory, Mansfield, Ohio, for lighting purposes. The generators will be directly coupled to Ball engines.

The Metropolitan Electric Company, Chicago, has just taken the agency for the Diehl Manufacturing Company, of Elizabethport, N. J., and will carry in stock a complete line of their ceiling fan motors. The Diehl Manufacturing Company are one of the oldest manufacturers in the country of ceiling fan motors in their various shapes and styles, and the Metropolitan Electric Company is fortunate in securing this agency.

The Electric Appliance Company, of Chicago, state that they are well prepared for the fan motor season with a very complete line. They still retain the agency for the Meston line of alternating current apparatus. The agency for the Dayton ceiling and column fan has been secured for this season. The new Acme fan motor manufactured by the Appliance company will also be a specialty for this season. It is made in both single and three-speed and is a high-grade machine.

The Electrose Manufacturing Company, for the second time within a few months, are compelled to seek larger quarters. After May 1 their factory and office will be 127-137 North Tenth street, Brooklyn. The new factory will have 13,000 square feet of floor space. The success of the electrose composition for insulation and particularly telephone transmitters and receivers has been very gratifying. The company's New York office will be at 190 and 192 West Broadway, corner of Leonard street, and will be in charge of Mr. Joseph Steinberger.

Metropolitan Electric Company.—John Gorman, for 20 years practical electrician and dealer in electrical apparatus in St. Paul, will represent the Metropolitan Electric Company, of Chicago, in handling N. I. R. wire, Metropolitan lamps, "Mac" tape, P. & B. compound, varnish, etc. Mr. Gorman is prominently identified in electrical interests in St. Paul and Minneapolis, and has done a large share of the electrical work in that section during the last 20 years. The Metropolitan Electric Company is to be congratulated on getting Mr. Gorman to handle their goods.

The Cutter Electrical and Manufacturing Company, Philadelphia, have just sent out their new catalogue of C-S flush switches and accessories. It is a very handsome catalogue, the numerous illustrations being printed in photographic brown with the letterpress in an attractive shade of green. Full details are shown as to the interior construction of the switch, and plans for wiring are also given. The switches have so long been before the public that an indorsement is unnecessary, but a short list of some of the users is printed on the last page of the catalogue. The catalogue is very artistically bound in heavy artists' paper, attractively printed in red and black. Ten thousand are now ready for distribution and will be sent upon application.

Graphite for Cycle Chains.—No material has so strong an affinity for iron and steel as pure, soft flake graphite, and for bicycle chains and sprockets there is nothing equal to it. The Dixon Crucible Company, Jersey City, N. J., selects its choicest material from unlimited stocks, and, after analyzing all other cycle-chain lubricants in the market that it could find, does not hesitate to say that Dixon's No. 691 cycle-chain graphite is absolutely without an equal for preventing rust and wear of chain and for insuring ease and comfort in riding. Mr. Tom W. Winder, the man who rode 21,000 miles around the borders of the United States, was offered all sorts of chain lubricants, and Dixon's was found superior to anything offered. He says: "It saved me much hard work, as its application never failed to cause an easy running chain." No. 691 is the improved shape, and fits the tool-bag easily.

The American Medical Congress

Will convene at Atlanta, Ga., May 5 to 8. This convention will be largely attended from the eastern and New England States. The Southern Railway, "Piedmont Air Line," is the direct line from the East to Atlanta, making the trip from New York in less than 24 hours. Solid Pullman vestibule train of dining and sleeping cars New York to Atlanta. The low rate of one and one-third fare for the round trip has been made for the occasion. For further information, call on or address the eastern office of the Southern Railway, 271 Broadway.

ADVANCE INFORMATION

Valuable News and Tips for Manufacturers and Dealers.

We publish below information relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW.

Electric Light and Power.

BROOKLYN, N. Y.—The Bergen Beach Light and Power Company has been incorporated; capital, $25,000. Objects: To furnish heat, light and power. Directors, Van Wyck Rossiter, H. Hobart Porter, Jr., Frederick Giblin.

MADISON, IND.—The contract for an electric light plant and electric street railway franchise has been awarded to George H. Knebel & Company of Chicago. Work was commenced April 15.

HOUSTON, TEX.—The Texas Automatic Light Company has been incorporated. Purposes: The manufacturing and supplying of light to the public through a system of hydrocarbon lighting. Capital stock, $50,000. Incorporators, J. D. McGregor, A. A. Moore, G. P. Skinner, O. Rowe, John H. Kirby, Frank Andrews.

CLARKSVILLE, TENN.—An electric system is to be constructed at this place at a cost of $100,000.

WASHINGTON, D. C.—The Potomac Light and Power Company; electric light hearing held before subcommittee of the Senate District Committee, on the subject of the bill granting the company the right to lay mains and make connections in this city. Nothing definitely arrived at.

WORTHING, IND.—Arthur Lowe is interested in the construction of an electric light plant, for which bids are invited until April 30.

CROTON, N. Y.—W. W. Hare, secretary Water Commissioners, can give information concerning construction of an electric light plant, for which $10,000 has been appropriated.

EARLVILLE, ILL.—John T. Wilson has been granted a 25-year franchise to operate an electric light plant.

WEST UNION, IOWA—Theo. Von Rolf has been granted franchise to put in an electric light plant.

PORTSMOUTH, N. H.—Frank Jones will erect a new electric light plant building.

HIGHLAND, ILL.—The General Electric Company has purchased the electric light plant of this city for $7,500.

UTICA, N. Y.—J. A. Cantwell, City Clerk, may be addressed concerning construction of electric arc lights of 2,000 candle-power each, for which the city will shortly advertise for bids.

CONWAY, ARK.—An electric light plant is to be established. Site has been purchased for same.

NORTHPORT, ALA.—The Tuscaloosa Electric Light Company will light the streets of Northport with electricity.

HARTFORD, CT.—An electric lighting system is to be established, and George Phillips, of Norwich, has been awarded contract.

KENOVA, W. VA.—Steps are being taken to establish an electric light plant.

FOND DU LAC, WIS.—The Fond du Lac Electric Company, Elihu Colman, president, and T. A. Green, secretary and manager, will construct an electric light plant.

NEWPORT NEWS, VA.—The Peninsula Light and Power Company has been awarded contract for installing an electric light plant.

GREENVILLE, N. C.—S. C. Hamilton has commenced the establishment of his electric light plant.

BROOKLYN, MD.—John H. Geis and others have obtained charter and will erect an electric light plant, etc.

KEY WEST, FLA.—The Tropical Electric Company has been incorporated by J. L. Watrous, president; E. M. Martin, secretary-treasurer, for operating electric plants, telephone lines, railways, etc. Capital stock, $50,000.

JACKSONVILLE, FLA.—George Reese, of the Morrison Southern Electric Company, of Baltimore, has commenced the work of installing 500 lights in the Government Building. The current will be furnished by the city plant.

SALT LAKE CITY, UTAH—The Big Cottonwood Power Company have been granted an extension of time for the construction of their road until May 1, when the electric light people will make the connection, and the Big Cottonwood company will be in active operation.

MARTINSBURG, W. VA.—The Martinsburg Electric Company has been organized with W. W. Housworth, secretary and manager, to succeed the Edison Electric Illuminating Company. Capital stock, $50,000.

GREENVILLE, S. C.—Secretary of the Mills Cotton Manufacturing Company can give information concerning electric light plant to be installed in cotton mill now approaching completion.

COLUMBUS, OHIO—Josiah Kinnear, city engineer, can give information concerning erection of electric light plant, for which $300,000 in bonds will be issued.

LEBANON, MO.—Lebanon Light and Magnetic Water Company has been incorporated to furnish electric light and water. Capital stock, $20,000.

New Electric Railways.

WASHINGTON, D. C.—The Washington Traction Company, it is reported, will shortly purchase the Tennallytown & Rockville Electric Railroad, which is to be sold, and will extend same from Bethesda to Washington.

BROOKLYN, N. Y.—The Nassau Electric Railroad Company has leased the Atlantic avenue lines for 999 years, at a rental of $180,000.

LITTLE ROCK, ARK.—The Little Rock Traction and Electric Company has been granted permission to extend its line.

FAYETTEVILLE, ARK.—An electric street car system will be constructed.

CHATTANOOGA, TENN.—S. W. Divine and others have applied for franchise for construction of electric road. The special committee appointed to investigate same will recommend that franchise be granted.

EAST LOS ANGELES, CAL.—Pasadena & Pacific Electric Railway; meeting held concerning construction of electric road on Griffin avenue.

KANSAS CITY, MO.—The Metropolitan Street Railway Company has purchased land on which it will erect a central power plant to furnish electrical power for all west side lines and those in Kansas City, Kas.

OREGON, MO.—Oregon & Forest City Railway, Light and Power Company has been incorporated to erect an electric power plant to operate its road.

GLENS FALLS, N. Y.—McCaghey & Linehan, contractors, have secured the contract for building an electric power house for the Plattsburg Electric Railway Company.

WILLOW GROVE, PA.—Thomas Heger, of Jenkintown, has secured the contract for erecting the new traction power house at this place. It will cost $10,000.

VANCOUVER, B. C.—The franchise and property of the Victoria Electric Railway and Lighting Company have been sold.

PITTSBURGH, PA.—The Monongahela Passenger Company has been incorporated, with James D. Cullery, president, to build an electric railway on Greenfield avenue. Capital stock, $12,000.

BRIGHTON, MASS.—The West End Street Railway Company will extend its electric line.

OREGON, MO.—Forest City and Oregon will shortly be connected by an electric road.

WEST SPRINGFIELD, MASS.—The Springfield Street Railway Company, at a meeting of selectmen held April 28, presented petitions to operate its cars by electricity.

WORCESTER, MASS.—Otis E. Putnam and others are interested in the construction of an electric road through Northboro, Shrewsbury and Marlboro. It is reported that capitalists in Boston will put $200,000 in the enterprise as soon as the company is ready to build.

NEW YORK, N. Y.—The Pennsylvania Railroad Company has awarded contract for lighting the Baltimore & Potomac tunnel with electricity to David E. Evans & Company.

JACKSONVILLE, FLA.—W. L. Dorr and W. A. Evans will build an electric trolley road from Federal Point to Hastings station on the Florida East Coast Line Railroad, using their artesian wells for generating the electricity.

ALBANY, N. Y.—William H. Slingerland, Jr., has made a survey to construct an electric road to connect Albany, Slingerlands, New Scotland, Clarksville, Gallupville and Schoharie.

SOUTHPORT, CT.—There is some prospect that a complete trolley system will soon be in operation between Bridgeport and Norwalk.

TIFFIN, OHIO—Sheriff Van Nest has sold the Tiffin & Fostoria Electric Railway to S. B. Sneath, of the Tiffin Commercial Bank.

PLATTSBURGH, N. Y.—The contract for constructing six miles of electric railroad in Plattsburgh has

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been awarded to Sanderson & Porter, of New York. It is the intention of the company to construct lines on Peru, Charlotte, Bridge, Margaret, Cornelia, Platt, Beekman, Broad and Court streets. Ground has already been broken for a new power house.

New Telephone and Telegraph Companies.

LA CROSSE, WIS.—The La Crosse & Southeastern Telephone Company, which is the Viroqua branch of the La Crosse Telephone Company, will build a line out through Mormon Coolie, extending 12 miles out of La Crosse.

MAHONINGTOWN, PA.—The Citizens' Telephone Company will establish an office at this place in a short time.

BELLAIRE, OHIO—The Ohio Valley Telephone Company awarded the contract for the construction of the new telephone exchange to J. H. Wood & Brother.

BENWOOD, W. VA.—The Central District Telephone Company has about perfected plans for the establishment of a central station at this place.

MECHANIC FALLS, ME.—Fernald, Keene & True have bought out the Briggs telephone line from this place to Poland.

BROOKLYN, N. Y.—The New York & New Jersey Telephone Company will erect a building to be utilized for the main offices of the company. It will be known as the Brooklyn central office.

BANGOR, ME.—The New England Telegraph and Telephone Company intends to complete its telephone service between this place and Pittsfield this Spring.

MINNEAPOLIS, MINN.—Contracts for the construction of 800 miles more of telephone wires over the State have been signed by the Northwestern Telephone Exchange. The work will be pushed rapidly, and 200 men will be at once put to work.

Miscellaneous.

SAN FRANCISCO, CAL.—Security Electrical Inspection Company has been incorporated by A. St. John Bowie, Oscar Blain, Joseph Napthaly, Alfred Bouvier and Thos. J. Craig, of San Francisco. Capital stock, $100,000.

KITTERY, ME.—Electrical Textile Machinery Company has been organized with a capital stock of $1,000,000. Edwin D. Capen, of Cambridge, president, and George A. Chipman, of Boston, treasurer.

NEW YORK, N. Y.—Phonograph Record and Supply Company has been organized; capital, $10,000. Directors, W. H. Miller, of Orange, N. J., and D. H. Clark, M. C. Fleming and H. B. Cayley, of New York city.

BUFFALO, N. Y.—The Electric Sand Company has been incorporated. Capital, $100,000. The directors for the first year are Thomas F. Clean, of Brooklyn; Thomas H. Spaulding and John R. Keim, of New York city; Harmon H. Fulton, of Elmira, and David L. Whittier, of Indianapolis. The principal office will be in this city.

New Manufacturing Companies.

BROOKLYN, N. Y.—Staines, Peck & Taber Company has been incorporated by Charles T. Staines, of Newark, N. J.; Lewis A. Peck, of Brooklyn, and Thomas T. Taber, of Glen Cove, L. I., to manufacture and deal in electric fixtures, etc. Capital stock, $5,000.

TRENTON, N. J.—Sawyer Elevator Device Company has been incorporated by Hiram C. Roberts, Wm. H. Grove, Philadelphia, Pa., and Rodney D. Wells, to manufacture elevator appliances and electrical supplies. Capital stock, $40,000.

CAIRO, ILL.—Egypt Electric Company has been incorporated by William Kluge, Henry Hassenjaeger, Albert Lewis and Calvin V. Neff. Capital stock, $40,000.

BROOKLYN, N. Y.—H. P. Ball Manufacturing Company has been incorporated to manufacture electrical appliances; capital, $20,000. Directors, John E. Ball, Christopher B. Keough and M. A. Vosburgh, of Brooklyn.

PORTLAND, ME.—The Self Contained Equipment Company has been incorporated for the purpose of owning, leasing, etc., patents relating to electric railway equipments, and manufacturing and selling the same, with $500,000 capital stock. The officers are: President, Arthur C. Libby, Portland; treasurer, George H. Drew, Boston.

Business Troubles.

NEVADA, MO.—Cashier H. M. Duck, of the Bank of Nevada, has been appointed receiver of the English Healy Telephone Company.

NEWARK, OHIO—The consolidated street railways of this city have been placed in the hands of a receiver.

OTTUMWA, IOWA—The Ottumwa Electric Railway, Light, Power and Steam Company, capital, $500,000, has gone into the hands of a receiver.

Increase of Capital.

GLEN COVE, N. Y.—The Franklin Electric Illuminating Company has voted to increase its capital stock from $25,000 to $35,000 in order to duplicate the power machinery.

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REMOVAL
OF THE
Electrical Review
TO THE
Times Building,
39 & 41 PARK ROW,
NEW YORK.

On May 1st the offices of this journal will be removed to the well known and modern *Times* Building, at the junction of Park Row and Nassau street, a few numbers above our former address.

This change, after nearly a decade in its present location, the ELECTRICAL REVIEW is compelled to make to allow for a new building to be erected.

All communications to this journal should be addressed, after this date, to the

Electrical Review,
TIMES BUILDING,
P. O. Box 2339, NEW YORK.

April 28, 1896.

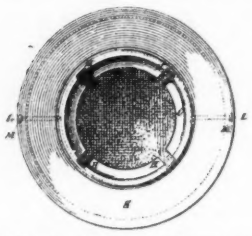
ELECTRICAL PATENTS

ISSUED APRIL 21, 1896.

558,480 Apparatus for electrically working and welding coffee; G. D. Burton, Boston, Mass.

558,491 Electric street car motor; S. Harris, Cleveland, Ohio—An electric street car motor having each of its field coils separately detachable with its core from the motor body, and the body separable in the plane of the armature shaft.

558,506 Printing telegraph. 558,507



No. 558,634.—ELECTRIC GLOW LAMP.

Automatic governing device for motors; B. F. Merritt, Newark, N. J.

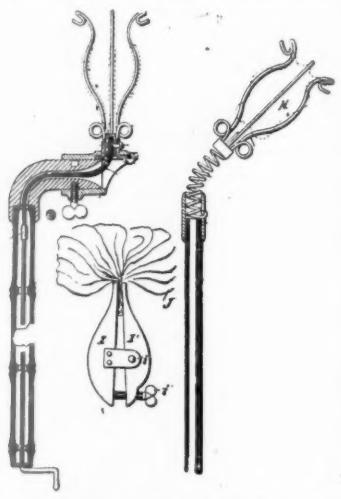
558,517 Regulator for electric motors; O. H. Pieper, Rochester, N. Y.—Consists of a shunt-wound motor, a variable resistance capable of variation when the motor is running connected across between one wire, or connected across between one wire or conductor of the field, and the corresponding wire or conductor of the armature.

558,518 Handle for circuit-breakers; W. B. Potter, Schenectady, N. Y.—A plurality of automatic circuit-breakers, and an interchangeable handle thereof, removable only when the circuit is open.

558,539 Core for electro-magnets; A. G. Waterhouse, Hartford, Ct.—A curved laminated magnet core formed by a rolled strip or strips assembled side by side and each thinner at one edge than at the other.

558,555 Electric guest call; S. K. Gimbel, Vincennes, Ind.

558,559 Electric rheostat or heafer; H. W. Leonard, East Orange, N. J.—A con-



No. 558,573.—APPARATUS FOR DETACHING ELECTRIC LAMP BULBS.

ductor, a supporting body and a layer of insulating material between the same and in which the conductor is partially embedded, and which attaches the conductor to the supporting body.

558,564 Electric alarm system; C. A. Rolfe, Chicago, Ill.—Comprises signal-transmitting mechanism connected with the main line, and an auxiliary or home circuit for operating said signal transmitting mechanism provided with a bridge and an alarm operated by a current crossing the bridge.

558,565 558,566 Railway signal; W. G. Roome, Jersey City, N. J.—Consists of a circuit containing the signal or signals, and a circuit comprising a continuous length of wire arranged near the track of a railway, and adapted to be broken or disarranged by a land-slide or similar disturbance, thereby controlling the signal circuit.

558,573 Apparatus for detaching electric lamp bulbs; O. Smith, Detroit, Mich.—A lamp-detacher comprising a flexible shaft provided with means for engaging the lamp and means for rotating said shaft.

558,584 Telephone; S. D. Field, Stockbridge, Mass.—Consists of a diaphragm, a magnet coil, and core thereof, a closed conducting circuit surrounding the core.

558,585 Electric metering system; J. W. Gibboney, Lynn, Mass.

558,602 Electric signal for railway trains; E. J. Devine, Schreiber, Can.

558,609 Drop-light electrolier; G. Peeples, Philadelphia, Pa.

558,617 Telegraph key; W. E. Simons, Dublin, Can.

558,634 Electric glow lamp; E. A. Colby, Newark, N. J.—Comprises an inducing coil, a receiver within said coil and within said receiver, and surrounded by said coil, a closed conductor in flat circular form having its face disposed in a plane parallel to the face of the coil.

558,650 Means for controlling electric currents; P. Kennedy, Brooklyn, N. Y.

558,672 Relay; F. E. Chapman, Medford, Mass.

558,686 Telephone trunk circuit; W. H. Hennesey, Chicago, Ill.

558,687 Apparatus for operating electric switches; D. Hinchliffe, Plymouth, Mass.

558,692 Method of manufacturing electrodes; I. Kitsee, Philadelphia, Pa.

558,714 Electric heating; C. S. Bradley, Avon, N. Y.

558,717 Process of electrically treating fabrics for waterproofing or other purposes; H. L. Brevoort, Brooklyn, N. Y.—Consists in moistening the fabric with an electrolyte, pressing it between an anode of an oxidizable metal and a suitable cathode, passing a current of electricity through the moistening fabric, oxidizing the anode and depositing the oxide on or in the fabric.

558,727 Electric stand-lamp; R. Graves, Irvington, N. Y.

558,741 Trolley; J. H. Rabbitt, Wethersfield, Ct.

558,749 Electrically controlled gas engine or motor; G. L. Thomas, Montclair, N. J.

558,750 Multiple contact switch; E. H. Wright, Chicago, Ill.

558,758 Fastening insulator brackets; L. S. Beardsley, Naugatuck, Ct.—Consists of a main portion having its upper end screw threaded for the reception of the insulator hood, and its lower end formed with lugs.

558,858 Railway block signal; F. C. Stevens and J. Donovan, Lowell, Mass.

558,859 Telephone apparatus; A. Stromberg and A. Carlson, Chicago, Ill.—Consists of permanent bar magnets, of pole-pieces mounted upon the ends of said magnets, between which the armature is adapted to rotate, soft iron cores extending from the ends of said magnets opposite those upon which said pole-pieces are mounted, the ends of said cores lying in proximity and carrying telephone coils, a diaphragm mounted opposite the ends of said cores, and a bar of magnetic material connecting the middle portions of said permanent bar magnets to afford a path for the lines of force and render the magnetic fields of the generator and of the telephone independent and distinct.

558,868 Means for reversing trolley pole supports. 558,869 Trolley for electric railway cars; H. P. Wellman, Ashland, Ky.—A car having a pivoted overhead trolley pole, a pneumatic device for engaging said trolley pole and automatically effecting the lowering of the outer end thereof in the event of the trolley wheel jumping off the wire.

558,870 Electric railway car; H. P. Wellman, Ashland, Ky.

558,904 Electrolier; A. Heck, Philadelphia, Pa.

558,911 Fixture for incandescent lamp burners; J. W. McKnight, Philadelphia, Pa.

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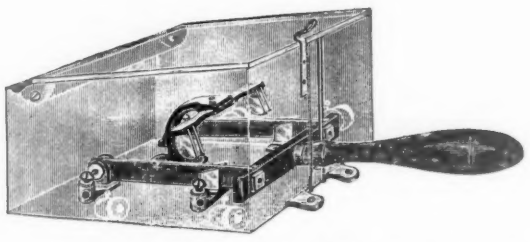

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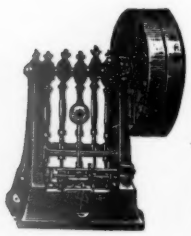

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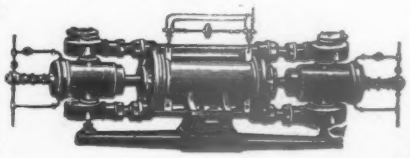

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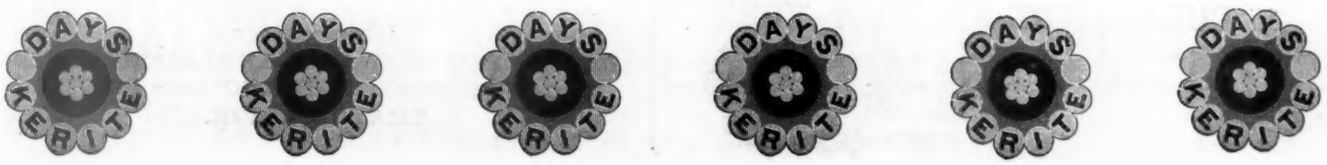

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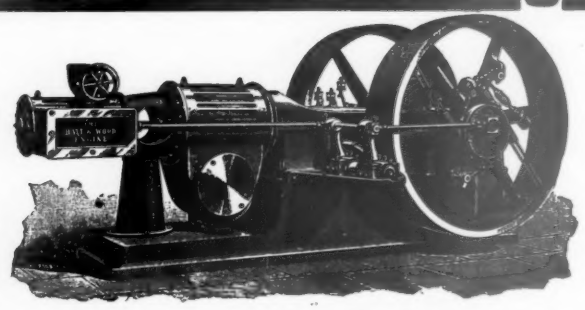

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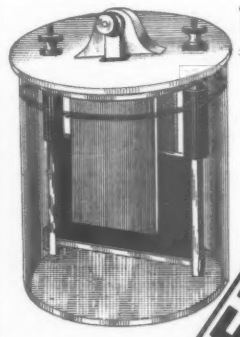

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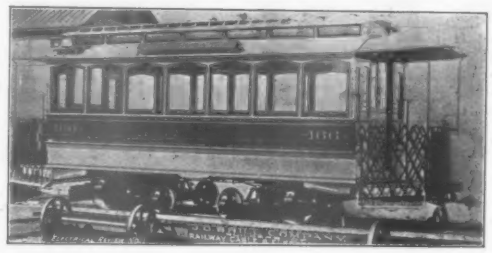

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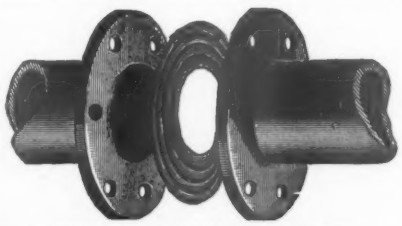

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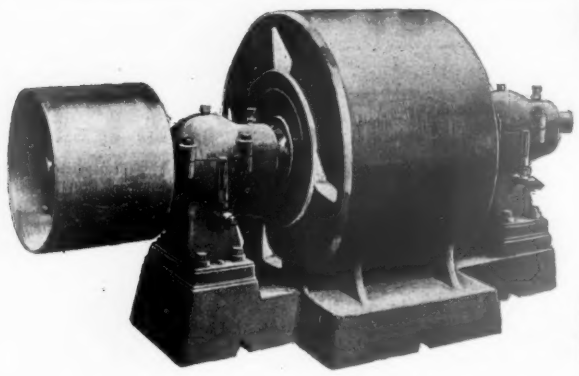

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